

Non-Naturals:

Being a Brief

EXPLICATION

Of the Changes made in

Humane Bodies.

BY

AIR, DIET, &c.

TOGETHER WITH

**An Enquiry into the Nature and Use of
BATHS upon the same Principles.**

To which is Prefix'd,

The Doctrine of ANIMAL SECRETION in several Propositions.

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L O N D O N:

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THE PREFACE.

TO attempt any Thing for the Improvement of useful Arts, especially that of Medicine, which is of the greatest Benefit to Mankind, is a Debt that every capable Person owes to the Publick; all Civil Societies having a Right to the Property of private Persons for the Common Good.

Whether the following Papers are like to answer that End, I leave to the Censure of capable Judges; for it is not every Pretender to Medicine, of how great Repute soever, that is a competent Judge of some demonstrated Truths. And tho' I do not confine my self to Geometrical Reasonings, yet I'm sure that he who understands not something of Euclid, is unfit to pass his Censure upon this Undertaking. I do not say that the Practice of Physick ever will be, much less that it now is, the Object of Mathematical Certainty: But this I dare assert, That what Improvements there have been, or are likely to be made in

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the Theory of Medicine, are only under the conduct of Arithmetick and Geometry.

A Humane Body is a curious Machine, and so far exceeds the Workmanship of the most Nice and Skilful Artificer, as Divine Wisdom surpasses the Understanding of a finite Mind, but yet it is subject to the same Laws of Motion, by which the infinitely Wise God governs the Universe. 'Tis compos'd of Solids and Fluids, both govern'd by the Laws of Gravitation, Impulse and Reaction, and what changes are brought about in the Animal Oeconomy by the motion of Matter, under the conduct of these Laws, can no way be estimated without some assistance from the Mathematicks.

It is a Maxim universally receiv'd among Physicians, that Medicine should begin where Philosophy ends; and 'tis undoubtedly a necessary qualification in a Physician, to be a good Philosopher; but all the Philosophy that has yet appear'd in the World, is no better than Trifling Romance, except what hath been writ by the famous Sir Isaac Newton, and some few others, who have built their Philosophical Reasonings upon Mathematical Principles. The wonderful Discoveries this Great Man has made by Geometrical Reasonings on Matters of Fact, are truly surprizing, and I question not but
if

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if the like Method were made use of for searching into the Causes of Diseases, and the Nature of Medicines, by as good a Head; that a short time would discover something as remarkable in our Little World, as that Illustrious Author has done in the Great.

We have some Earnests of what we may expect in this way, from the Writings of Borrelli and Bellini, and in our own Island the Learned Pitcarne, Mead, Cheyne, and some few others, who have made greater Discoveries in the Animal Oeconomy than many Ages before can boast of. The Method these Gentlemen begun, I have pursu'd; and if what I've writ be of any Use to the Publick, 'tis a Recompence for my Labour; if not, I cannot help it, I am not the first that has been mistaken in his own Performances.

I have prefix'd to the Book some Propositions concerning Animal Secretion, not only to save my self the labour of frequent Repetitions, (having occasion to refer to 'em so often) but because little or nothing has been said to the purpose by any, on this Subject, except what we have in some of the fore-mentioned Authors. Besides, there is no part of the Art better deserves our enquiry into, than the Doctrine of Secretion, since there are but few Distempers which admit of a Cure without encreasing or lessening some Evacuation.

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To the Chapter of Air, I have subjoin'd some Thoughts of the operation of the Bath, whether Temperate or Cold, upon a Humane Body, and have accounted for the effects of Bathing, from either the Weight and Cold, or the Warmth and Moisture of Bath-Waters. I have also calculated the Weight of Water we sustain in Bathing, and demonstrated, that the constant expulsion of Perspirable Matter thro' the Pores of the Skin, is not sufficient to resist the entrance of Water into the Body when we Bathe; and also shew'd how the wearing of Flannel becomes prejudicial to weak People.

The other Parts of my Discourse fall naturally under their proper Heads. As to the Style, tho' it be rough, yet if 'tis but Intelligible, 'twill be enough for my Purpose. I must confess the uncorrectness of the whole Work, which had yet been more so, had it not been for the Inspection of my Ingenious Friend Dr. Coats: But be it as it will, I'm sure it was design'd well, and may, if read without Prejudice, answer its Design, at least so far as to excite a better Hand to correct its Errors, and supply its Defects.

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P R O P. I.

A *Fluid* must have its compounding Parts small, spherical, or approaching thereto, smooth, or such as can slide easily one over another, and if *Homogeneous*, the Parts must be of equal density, by the 147th Proposition of *Borelli, De Motibus Naturalibus à Gravitate factis.*

P R O P. II.

Fluids press *Undique*, and the direction of their pressure is in every Point perpendicular to the sides of the containing Vessel, and therefore *Secretion* is perform'd by a composition of two Motions, one direct, and the other transverse.

P R O P. III.

A Heterogeneous Fluid at rest in the Body, and equally press'd, the most liquid Part is forc'd out first.

A 4

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P R O P. IV.

A *Heterogeneous Fluid*, such as the Blood, whose compounding Parts are of different Densities, upon its Stagnation will percipitate its heavy, and elevate its light Parts, and they all in time will take their Places according to their Specifick Gravities; and where the *Fluid* does not stagnate, the separation of the heavy Parts from the light, will be in proportion to the slowness of the motion of the *Fluid*.

P R O P. V.

The red Fibrous Part of the Blood, upon its Stagnation, retires into the center, and forces the *Serum* to the sides of the containing Vessel.

C O R O L.

The slower the Blood's Motion is, the more *Serum* is separated.

P R O P. VI.

Fluids resist the Motion of such Bodies most, whose Surfaces are greatest, in proportion to their Solidities, or in other Words, whose Specifick Gravities are the least.

P R O P. VII.

The most viscid Parts of the *Serum* are lightest, viz. such as are separated in

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in the Glands of the *Nose, Mouth, Palate, Windpipe, Stomach, Guts, &c.* being these swim in Water, which is lighter than *Serum*.

COROL. to the two last P R O P.

The most viscid Part of the *Serum* of the Blood is the least susceptible of Motion, or moved with the greatest difficulty through the Arteries.

P R O P. VIII.

A Fluid forc'd thro' a Concave Cylinder, moves with greater celerity at the *Axis*, than at the sides, (*by the 215th Prop. of Borelli, De mot. natural. à gravitate fact.*) and much more so through a Concave Cone.

P R O P. IX.

(a) *Baglivi* hath observ'd the Motion of the Blood swiftest in the middle of the Artery of a *Frog*, and therefore the most light Parts being less susceptible of Motion, will be forced to the sides of the Arteries where there is the least Motion, so that where there is the least Motion, there will the lightest (being the most Viscid) (*by the 7th Prop.*) part of the *Serum* be separated.

(a) *De Praxi Medica*, p. 393.

COROL.

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COROL.

The Viscidity of the separated Fluid will be reciprocally, as the Celerity of the Blood at the Orifice of the separating Canal.

COROL. II.

The Velocity of the Blood at the Orifice of the separating Canal, being as the number of Plications in the complicated Artery; (by the 40th Prop. of *Bellini de motu Cordis*) therefore the Viscidity of the secreted Matter, will be as the number of Plications in the complicated Artery.

P R O P. X.

When the Motion of the Blood is too slow, the most serous Part of the Blood is thrown upon these Arteries, which are the smallest, most complicated, or at the greatest distance from the Heart. For the Motion of the Blood being too slow, more of the red part of it will move along the *Axis* of the Artery than before (by the 5th Prop.) therefore the red Part will move with much greater celerity than the Serum, (by the 8th and 9th Prop.) and consequently thro' such Arteries where there is the least resistance, viz. thro' the widest, the least complicated, and those nearest the Heart, for which reason the Serum will be forced upon such

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such Arteries as are the smallest, most complicated, or at greatest distance from the Heart.

P R O P. XI.

A *Gland* is a complicated Artery (over whose outward Coat, as in all the Arteries and Veins, are branches of Nerves to serve their spiral Contortion) which sends Excretory Vessels out of its sides, after which it degenerates into a Vein. This is Dr. Cheyne's 1st Prop.

P R O P. XII.

The *Innestines* are a Gland, and the *Lacteals* are the Secretory Vessels. This is Dr. Cheyne's 4th Prop.

P R O P. XIII.

The Orifices of the Excretory Vessels of every Gland are circular, being all the Vessels in which the Fluids of the Body move; are either Concave Cylinders, or Cones; for the pressure of a Fluid being always perpendicular to the sides of the containing Vessel, and being at equal distances from the center, the sides must be every where equally distracted, viz. a Section perpendicular to the *Axis* of the Vessel, must be a Circle, and consequently the Vessel be either Cylindrical or Conical. This Prop. is more fully

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fully demonstrated in Dr. Pitcarne's *Dissertation de Circulatione Sanguinis, &c.*

COROL.

The Orifices of the Excretory Vessels of different Glands, differing only in their Magnitude, the Fluids separated in different Glands, will differ only in degrees of *Cohesion* and *Fluidity*.

COROL. II.

Any peccant Matter in the Blood may be evacuated by any of the Glands, provided their Orifices be but sufficiently enlarged.

COROL. III.

The encreasing of one Evacuation will lessen another, and *Vice versa*.

P R O P. XIV.

All the *Conglomerate Glands* have Coats made of Muscular Fibres, with which they force out their Contents by contraction, and the more in quantity, or the more forcibly any secern'd Matter is to be expell'd, the stronger are the Muscular Fibres.

P R O P. XV.

The relaxed Coat of any Gland encreases the Viscidity of the secerned Matter, and *Vice versa*, for the secerned Matter will grow much more Viscid by staying

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ing longer in the Gland, the thin Parts being evaporated by the heat of the Body, the rest will be more Viscid.

COROL.

Opiates, Drunkenness, and whatever makes an universal Relaxation, encrease the Viscidity of the Matter separated in all the *Conglomerated Glands.*

P R O P. XVI.

Such Glands whose compounding Arteries are most complicated, seern the most Viscid Matter from the Blood.

Demonstration.

Let there be a branched Canal of the annex'd Figure,  and let the extremity of one of the Branches *c* be shut up, and the other Branch *b* be open, then by an Engine force thro' the Trunk *a*, any kind of Viscid Liquor, such as the Blood, or whose compounding Parts are some more, and some less Fluxil, and it will equally run into both the Branches, till the Branch *c* be full, but after that, what shou'd move through *c*, must pass thro' *b*, so that the whole Liquor that passes thro' the Trunk *a*, must likewise, in the same time, pass thro' the Branch *b*; now *b* being much straiter than *a*, the
Lis

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Liquor must pass with greater celerity through *b* than *a*, (by the third Corollary of the 10th Theorem of Mr. Keill's *Lecti-ones Phisicae*.)

So that such Parts of the Liquor as are most easily moved, will first pass the Branch *b*, and the Parts that are least susceptible of Motion, or in other words, those which are most Viscid, will be soliciting their entrance into the Branch *c*, but this Viscid Matter cannot enter, without forcing some of the most moveable or fluid Part of what is contain'd in *c* into *b*, so that *c* will constantly fill with Viscid Matter, till it can hold no more. If therefore the extremity of the Branch of any Artery be totally obstructed, it is hereby disposed to fill with the most Viscid Matter the Blood can supply, and that for this reason, viz. because the progressive Motion of the Blood thro' that Branch must cease, and in such Branches of any Artery, where the motion of the Blood is most retarded, thro' that Branch will the most Viscid Part of the Blood pass, as the most Fluid will in those Branches where there is the least resistance to the Motion of the Blood. Now in every complicated Artery, the resistance being greater than in a strait one,

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one, the Motion of the Blood will be slower, and that in proportion to the number of Plications in the complicated Artery; therefore in the Arteries which are most complicated, the Motion of the Blood in 'em being the slowest, its Viscidity will be the greatest, and therefore such Glands whose compounding Arteries are most complicated, secrete the most Viscid Matter from the Blood. Q. E. D.

P R O P. XVII.

The quantity of Fluid Matter separated in any Gland, is in compound proportion of the quantity of Blood, its celerity at the Orifices of the Excretory Vessels, the wideness of the Orifices of these Vessels directly, and the Viscidity of the Blood reciprocally.

Demonstration.

The celerity of the Blood's Motion, the wideness of the Orifices, and the Viscidity of the Blood, being given, the quantity separated must be as the quantity of Blood directly, for a greater quantity separates more, and a less quantity separates less.

The quantity of Blood, its Viscidity, and the wideness of the Orifices being given,

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given, the quantity separated will be directly, as the celerity, for a greater celerity gives a greater quantity, and a less celerity a less.

The quantity of Blood, its Celerity and Viscidity being given, the quantity separated will be directly as the wideness of the Orifices, for the wider the Orifices, the more will be separated, and the straiter the less.

The Quantity and Celerity of the Blood, and the wideness of the Orifices being given, the Quantity separated will be reciprocally as the Viscidity of the Blood, for the greater the Viscidity, the less will be separated; and the less the Viscidity, the more; therefore none of these being given, the Quantity separated will be as the quantity of Blood, &c. Q. E. D.

P R O P. XVIII.

An encreased quantity of Blood, encreases the Fluid Secretions, in a proportion greater than the Viscid.

Demonstration.

The quantity of Blood being encreased, the Diameter of all the Vessels will be enlarged, but in different proportions, for the same force being the encreased quantity of Blood applied to the less

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less complicated Arteries, will distract them, or enlarge their Diameters more than it will the more complicated, being the resistance in these is greater than in those, and that in proportion to the number of the Plications, one Artery hath more than another; now the quantity of separated Matter being, *Ceteris paribus*, as the wideness of the separating Canal, (*by the last Prop.*) the quantity separated in the less complicated Artery whose Diameter is more enlarged in this Case, will be greater than what is separated in a more complicated Artery, and seeing such Glands whose compounding Arteries are most complicated, secrete the most viscid Matter from the Blood, and the least complicated the most Fluid (*by the 16th Prop.*) Therefore an encreased quantity of Blood by encreasing the Diameter of the less complicated Arteries, more than of the more complicated, encreases the Fluid Secretions more than the Viscid. *Q. E. D.*

P R O P. XIX.

A decreased Quantity of Blood lessens the Fluid Secretions more than the Viscid: This needs no Proof, being the Reverse of the last Proposition.

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P R O P. XX.

An encreased Celerity of the Blood's Motion, encreases the Fluid Secretions more than the Viscid, and *Vice versa*. A decreased Celerity lessens the Fluid Secretions more than the Viscid.

Demonstration.

The Celerity of the Blood's Motion being greater, the *Impetus* by which the Arteries are distracted, or their Diameters enlarged, will be greater, and so exert its Force more upon the less complicated Arteries, than upon such as are more complicated, and consequently promote the Fluid more than the Viscid Secretions, (for the Reasons given in the Demonstration of the 18th Prop.) and because an encreased Celerity will, by breaking the Blood into small Parts, render it more Fluxil, and thereby supply a greater quantity of such Particles, as will pass the Glands, whose Diameters are the least, therefore upon this account also an encreased Celerity of the Blood's Motion, will encrease the Fluid Secretions more than the Viscid. Q. E. D.

P R O P.

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P R O P. XXI.

An universal Enlargement of the Orifices of all the Glands, encreases the Fluid Secretions more than the Viscid, and *Vice versa*, an universal Contraction lessens the Fluid Secretions more than the Viscid.

Demonstration.

The Diameters of the smallest Orifices being enlarged, are big enough to discern the Viscid as well as the Fluid Matter, and because the Matter discerned in different Glands, differs only in degrees of Cohesion and Fluidity (*by the 1st Corollary of the 13th Prop.*) therefore the Orifices of the small Glands being enlarged, the more Viscid Matter that used to be separated in other Glands, will be separated in these, and therefore less will be separated in these Glands that are fitted for Viscid Secretions, and more in those fitted for the Fluid. Therefore an universal enlargement of the Orifices of all the Glands, encreases Fluid Secretions more than Viscid. Q. E. D.

P R O P. XXII.

An encreased Viscidity of the Blood decreaseth the Fluid Secretions, more

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than the Viscid, and *Vice versa*. An encreased Fluidity encreaseth the Fluid Secretions more than the Viscid.

Demonstration.

A decreased Celerity of the Blood's Motion, lessens the Fluid Secretions more than the Viscid (*by the 20th Prop.*) but the Celerity decreaseth, as the Resistance encreaseth; now the Resistance is greater when the Blood is most Viscid, being it passes with greatest difficulty through the Capillary Arteries; therefore an encreased Viscidity, by lessening the Celerity, decreaseth the Fluid Secretions more than the Viscid. *Q. E. D.*

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The Introduction.

THat I may treat more Methodically of the Advantages to be reaped by a regular Use of the Non-Naturals, both with respect to the Preservation of Health, and the Cure of Distempers, I shall explain some of the most obvious Phenomena in Diseases both Chronical and Acute, that it may appear how well adapted they (the Non-Naturals) are by a Judicious Application, not only to confirm our Health, but restore it: And that in many Cases they will prove more efficacious than the most Celebrated Drug. We have Instances more than enow of such as by Change of Air, or a Luxurious Diet for one more Temperate, (which was Cornaro's Case) or Flesh meat, for Milk and Vegetables, or of such who have taken long Journies, or made long Voyages, or by Spontaneous Vomiting, Purging or Sweating, have been cured of such Distempers as would not yield to any Medicine, tho' never so generous.

The

2 The Introduction.

The Method I shall pursue, will be first to account for some General Disorders in the Stomach; then to give a short History and Theory of Three Remarkable Chronical Distempers, viz. the Asthma, Consumption, and Dropsie; and after that, to explain some of the most notorious Symptoms in Acute Distempers, especially in Fevers: With some short Hints towards establishing a better Method for the Cure of 'em, than what is followed by the generality of Physicians.

A
Mechanical Account
OF THE
Non-Naturals, &c.

CHAP. I.

Of the Stomach, and its Disorders.

§ I. **T**IS well known that the *Stomach* is design'd and fitted for the Digestion of our Meat, by which it is divided into such small Parcels as will pass thro' the *Lacteals*, into the Mass of Blood, for our Strength and Nourishment. 'Tis made up of *Membranous* and *Muscular Fibres*, fill'd with Arteries, Veins, Nerves, and Glands, by which a *Viscid Matter* is
sepa-

separated from the Blood, and pour'd into its Cavity, for very good Ends and Purposes:

§ 2. This, if increased, or diminish'd, either in its Quantity or Viscidity, gives rise to many disorders in the Stomach, as loss of *Appetite*, *Nausea*, *Vomiting*, especially in the Morning, which is common to hard Drinkers, *Distention* of the Stomach after Eating, &c.

§ 3. The Stomach by the help of its Muscular Fibres, together with the *Diaphragm* and *Muscles* of the *Abdomen*, is enabled so to *to*ss the Meat about, that if that Motion be not the sole, (according to the Learned (a) Dr. *Pitcarne*) yet 'tis certainly the principal Cause of *Digestion*. The force of the Muscles employ'd in this business, is almost incredible; for if the comparative Force of the Muscles be as their *Solidities* or *Gravities*, as he hath demonstrated; and the Force of the *Flexor Policis* be equal to 3720 Pound weight, according to the Calculation of (b) *Borelli*: How great then must the Force of all these

(a) *Dissertatio de Motu quo Cibi in ventriculo rediguntur ad formam sanguini reficiendo idoneam.*

(b) *De Motu Animalium, Par. I. p. 126.*

and its Disorders.

Muscles taken together ? * And indeed nothing else being necessary in the Business of *Digestion*, but that the Parts of our Food be so divided, that their greatest *Diameters* be less than the Orifices of the *Lacteals* ; the Strength of these Muscles, seems more than sufficient for that Work. However, be this as it will, every Body will own that the Muscles have a considerable Share in it. Hence it follows, that whatever encreaseth or lesseneth muscular Motion in general, or the Motion of the recited Muscles in particular, hastens or retards *Digestion*.

§ 4. An encreased Quantity of Blood helps our *Digestion*, for Dr. *Cheyne* hath demonstrated in his third *Lemma* in the *New Theory of Fevers*, that *ceteris paribus*, the Strengths of different Animals of the same Species, or of the same Animal at different times, are in a triplicate Proportion of the Quantities of the Mass of their Blood. And the whole Strength of an Animal, is the Force of all his Muscles taken together, therefore, whatever encreaseth the

* It is as the Doctor computes equal to 260000 Pound Weight.

C

Strength,

6 Of the Stomach,

Strength, encreaseth the Force of all the Muscles, and of these serving *Digestion*, as well as others. Yet notwithstanding the Truth of this *Lemma*, the Quantity of Blood may be encreased in such Circumstances, as to abate the Strength: The *Æquilibrium* between the Blood and Vessels being destroyed, wonderfully lessens the Strength, as is evident from several Passages in *Baglivi de Fibra Motrice*. The sudden Suppression of Perspiration, tho' it encrease the Quantity of the Blood, as it must considerably, by *Sanctorius's* Calculation, yet it lessens the Strength, because the retained Matter being what ought to be evacuated, so alters the Texture of the Blood, as to make it unfit for muscular Motion. Suppose the encreased Quantity be joyned with an encreased Viscidity, the Quantity of small separable Parts decreasing, as the Viscidity encreaseth, the Quantity of *Animal Spirits* separated in the *Brain*, will be less, and the Tensity of the Fibres being in Proportion to the *Animal Spirits* forced into them, they will not be able to counterpoise the greater Weight of the Blood, and so the Strength will be diminish'd.

§ 5. *Bellini* in his Forty ninth Proposition *de Motu Cordis*, proves, That if the Blood be so vitiated, as to encrease or diminish Strength, 'tis the same as if the Blood was in a natural State, but its Quantity encreased or diminished in the same Proportion. So that the Blood when vitiated, may so impair the Strength of the Muscles as to spoil Digestion, and yet in some Cases the Blood may be so vitiated, as to encrease Strength according to the Proposition, and thereby help Digestion. Therefore a voracious Appetite and strong Digestion are no infallible Signs of a healthful State of the Blood.

We have one Reason from what hath been said, why nourishing Food in little Quantities, so often helps a weak Digestion; as also why *Hectic* People digest their Victuals so very ill, the Quantity of their Blood being so much diminished as *Dr. Cheyne* (c) hath made out beyond Dispute.

§ 6. *Vomits, Bitters, Chalybeats, and Exercise*, especially in cool, dry Air, mightily promote Digestion, by strength-

(c) *New Theory of Fevers*, p. 134.

ning the Fibres, whereby muscular Motion is encreased, as well as by lessening the Quantity of viscid Matter, separated in the Glands of the Stomach; which *Vomits* do directly, and the other by encreasing Perspiration, whereby other Evacuations are lessened, for Dr. *Pitcarne* (d) hath proved, That the encreasing of one Evacuation, is the lessening of another.

Bitters and *Chalybeats* lessen the Viscidity of the Blood, and encrease its Celerrity, whereby it is better fitted for the Secretion of perspirable Matter, and also of *Animal Spirits*, which will strengthen the muscular Fibres, and so help muscular Motion, as appears by the twentieth Proposition of *Animal Secretion*.

How much *Exercise* in cool dry Air strengthens the Fibres, and encreaseth Health, is evident from the 7, 8, and 27 *Aphorisms* of *Sanctorius*, § 3. compared with the 34, and 35 *Aphorism*, § 5.

§ 7. It is easie to shew in other Circumstances, how necessary it is to relax the Fibres of the *Stomach*, when by

(d) *Dissertatio de Circulatione Sanguinis per vasa minima*, p. 33.

any means they are grown too *springy*. When the Fibres of the *Stomach* are too *Tense*, their *Vibrations* are smarter, and Sensation thereby more *acute*, so that what before was easie and delightful to the *Stomach*, is now most ungrateful and tormenting. In this Case there is often grievous Heat, Pain, Sicknes, and Thirst, and yet the *Stomach* is not able to bear the smoothest Liquor without *Vomiting*.

Besides this, the Orifices of the Glands are contracted, and thereby the *Stomach* robb'd of a great share of that Slime that should defend it; for the Quantity of Secerned Matter, is in a compounded Proportion of the Wideness of the Orifice, and Celerity of the Fluid, by the Seventeenth Proposition of *Animal Secretion*: And further, the secerned Matter is not only less in Quantity, but also thinner, and the thinner the Fluid is, the fitter it will be to dissolve the *Acid Salts* contained in the Blood, which by this means will be better stocked with them, and consequently become a *Stimulus* it self to so sensible a Member as the *Stomach* is lined with. The Smallness of the Secretory Vessels, is not the only Cause why this

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fecerned Matter should be more Fluid, but also the encreased Velocity, with which the Blood moves in these contracted Vessels. That the Blood moves more swiftly in the contracted Arteries, is certain (from the 3d Corol. of the 10th Theorem of Mr. Keil's *Lectiones Physicae*) especially if the Contraction be Universal, as it will be by consent, as is evident from *Bellini de Stimulis*, *Baglivi de Fibra Motrice*, and also from several of *Sanctorius's Aphorisms* (e).

How the Velocity of the Blood's Motion should encrease the Fluidity of the fecerned Matter, seems more difficult to account for, since the Blood is so much disposed to deposit its Serum upon its slow Motion, as appears by Dr. *Lower's Experiment*, as also upon its Stagnation in a Porringer: But if we consider, that though the Serum be the most fluid Part of the Blood, yet it is however liable to great Alterations as to its Fluidity, and is the most Fluid when moved with the greatest Celerity, this Objection will be of no Force. The specifick Gravity of Serum is to that of

(e) *Med. Stat.* § 1. *Aphor.* 41, 50, 89, and 91.

Water,

Water, as six to five, according to Mr. Boyle's Observation; but yet this Proportion must be various, in different Subjects.

The encreased Velocity in the contracted Arteries, whose Vibrations for that reason are quicker, must needs break and divide the Blood, whereby it becomes Fluid, and so fitter for more Fluid Secretions, and it will likewise so mix and jumble together the yet remaining Viscid Parts, that they cannot in that Confusion separate from the other.

§ 8. The greater or less Quantity of *Saliva*, as Dr. Cockburne (f) hath proved, encreases or lessens both *Appetite* and *Digestion*. And the same Author hath also shewn how the greater Weight of the *Air* affects this Secretion.

(f) *Oeconomia Animalis*, p. 15.

C H A P. II.

Of the *Asthma*.

§ 1. **A**N *Asthma* is a laborious and difficult *Respiration*. It is divided into three Species, *Dyspnœa*, *Asthma*, and *Orthopnœa*.

1. A *Dyspnœa* is a dense and quick *Respiration*.

2. An *Asthma*, properly so call'd, is a frequent and strong *Respiration*, in which all the Muscles serving *Respiration*, are vehemently agitated. 'Tis join'd with a *Stertor* and *Wheezing*. Sometimes *Respiration* is strong and slow.

3. An *Orthopnœa* is the greatest Difficulty of Breathing, in which the Patient would be suffocated, if he did not sit upright. In all the Three sorts, *Inspiration* is more difficult than *Expiration*.

These three Distempers only differing in degrees, I shall treat of 'em all under the common Term of *Asthma*.

§ 2. An *Asthma* being only a greater or less Difficulty of Breathing, whatsoever

ever then will interrupt Respiration, will cause an *Asthma*.

That Respiration may easily be perform'd, 1. The Cavity of the *Thorax* must be enlarged, that the *Air* may enter the *Lungs*.

2. The *Air* must be *heavy* and *elastic*, without which Properties it would not sufficiently blow up the *Vesicula* in the *Lungs*, to make room for the Passage of the Blood thro' 'em; and yet if the *Air* be either too *heavy*, or *elastic*, it will stretch the *Vesicula* beyond their due Extent, and thereby obstruct the Passage of the Blood thro' the *Lungs*.

3. The Blood must be *Fluid*, and in fit Proportion to pass thro' the *Lungs*.

§ 3. In short then, whatever determines the Spirits in too great a Quantity, or too little into the *Muscles* serving Respiration (*viz.* The *Intercostals*, both *internal* and *external*, the *Subclavius*, *Serratus anticus major*, *Serratus posticus superior*, or *triangularis*, *Serratus posticus inferior*, *Sacrolumbaris*, and *Diaphragma*) by elevating the Breast too much, or too little, must hinder Respiration: Nay, if the *Lungs*, the *Aspera Arteria*, or the Membranes of the Breast, be either too lax, too dry, too much streightned by
spas.

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spasmodick Contraction, or windy Inflation, stuff'd with a Viscid Slime, fill'd with *Tubercles*, or stony Concretions, if there be either Matter or Water collected in the Cavity of the *Breast*, or *Belly-Dropsies*, *Tumors* in the *Liver*, *Stomach*, *Spleen*, or *Mesentery*; in all these Cases *Asthmatick* Symptoms will ensue.

§ 4. If the Blood be either too much in *Quantity*, too quick in its *Motion*, too much *Rarified*, or too *Viscid*, it will upon all these Accounts pass more difficultly thro' the *Lungs*, and therefore require the *Lungs* to be more nicely *Inflated*, than will happen in such Circumstances, for which Reason the *Patient* will be *Asthmatick*.

§ 5. A Fit of the *Periodick Asthma*, which falls most under a *Physician's* Care, often happens once in a Fortnight, (if cold bad Weather, or some Irregularity in Diet bring it not on sooner) and sometimes once a Month. I know a Lady who hath a Fit every time her *Menses* flow; and was rather worse than better for all the Medicines she had taken for Seven Years, as she told me when first I visited her: Yet by a Medicine better suited to her Case, was mightily re-

Of the Asthma. 15

relieved for almost two Years, and continues so yet, for ought I know to the contrary. The Fit is generally preceded by a *Flatulency* and *Distention* of the *Stomach*, and invades the *Patient* about One or Two of the Clock in the Morning, forces him, if violent, to rise out of Bed, and sit upright in a Chair : He finds a great Straitness at his Breast, and strives by all means to draw a greater Quantity of *Air* into his *Lungs* : His Urine is pale, and in great Quantity ; he can neither cough, sneeze, spit, or speak freely, the *Stomach* is now much more distended, and all heating Things encrease it. The Fit is less after Vomiting, Purging, or Fasting : When it is violent, the Heart palpitates, the Pulse intermits, the Face is almost black, and the *Patient* is subject to Swooning : When it begins to abate, he spits plentifully, and not till then ; sometimes a crude, and sometimes a concocted *Phlegm* ; which he is not very much troubled with again till the next *Paroxysm*. His Urine is high colour'd at the latter end of the Fit. All sudden Alterations of the Weather give a Fit.

Gill,

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Gill, Hyssop, Rue, Syrup of Garlick, Syrup of Sulphur, Tincture of Lavender, Spirit of Hartshorn, Myrrh, Saffron, Balm of *Giliad*, Balsam of *Peru*, Bal. of Sulphur, Anifat, Succinat, Terebinthinat, Tincture of Sulphur, with Syrup of Ground-Ivy, Lime-Water, Infusions of Millipedes, Hore-hound *lb. fs.* to six Gallons of Beer, Vomits, Bleeding and Purging; all these prov'd unsuccessful in the Intervals, as a very good Judge (g) in this Case informs us.

A full Diet, and especially Debauches, render the Fit more severe; a dry Air best agrees with the *Asthmatick*: he is free from his Fits in frosty Weather, if it be not too severe. Rain when it falls, does not much affect him; but the preceding Vapours do; damp Houses, fenny Grounds, high Winds, and Storms, mightily offend him: Any kind of Smoak is offensive, but the Smoak of Wood the most, and that of *Dutch* Turf the least. In Summer the Fits are both more frequent, and severe than in Winter. A Fit is generally encreas'd by the *Heat* of the Fire, or Bed, and eas'd by

(g) *Sir John Floyer's Treatise of an Asthma*, p. 18, and 19.

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opening the Window. All strong Liquors are prejudicial, especially in the Fit, new Drink of all kinds is improper.

All sorts of viscid, mucilaginous, and windy Viſtuals are prejudicial; Meat that ſwells leaſt in the Stomach, is beſt for the Aſthmatick.

Etmuller, Walſchtmicdt and Baglivi, commend Vomits, *Laudan. cum Ther. Androm. Millepedes, Terebinthinats, Baſam Peru, Sperma Ceti, Anti-hyſtericks, Anti-epelepticks*, and Solutions of Gum *Ammoniacum*, &c.

Sir John Floyer hath try'd moſt of the celebrated Medicines, commended by any of our *Modern Authors*, without any Advantage, but found Benefit by uſing the Preſcriptions of the *Ancients*, (b) and indeed they are much more agreeable to the *Theory* of this Diſtemper; and they who expect to be ſucceſſful in the Cure of it, muſt vary their Method according to the various Cauſes that produce it, which the foregoing *Theory* will give ſome Light into.

(b) Vide Nicol. Myreſſ. de Antidotis, Sect. 1. cap. cxxxv. Oribasii, lib. ix. & cap. v. & Aetii Tetrab. ib. 11. Sermon. iv. cap. lvii.

C H A P. III.

Of a Consumption.

§ 1. **A** *Phthisis* is a Consumption of the *muscular* Flesh, either with, or without a *Fever*. 'Tis either *Original* or *Symptomatical*. The *Original* is either *Nervous*, which is call'd an *Atrophy* or *Pulmonary*: It is the last I shall only take notice of in this Place. I shall first observe, What precedes a *Pulmonary* Consumption: Secondly, Recite the *Concomitants* of it; and in the next place, Take notice of its *Consequents*, in order to explain some of the most obvious *Symptoms* that attend it.

§ 2. The *Antecedents* of this Distemper are a Suppression of some natural, or præternatural Evacuation, without correcting the Cause on which it depended, grievous Passions of the Mind, drinking too plentifully of spirituous Liquors, an idle Course of Life, Night-Studies, fenny, heavy and smoaky Air, an hereditary Disposition, Crookedness,
 strait

strait Breasts, any thing let fall upon the Lungs, Distempers ill cur'd, and especially catching Cold in these Circumstances.

The Concomitants are,

1st. A *Cough*, which is thus distinguish'd from a *Catarrh*; 'tis owing to *Tubercles*, or some other Indisposition in the *Lungs*, with a Sense of Weight in the Breast, and Difficulty of Breathing, and in the beginning 'tis dry, tho' in the Progress of the Distemper it be moist.

A *Catarrh* is moist in the beginning, and terminates in a few Weeks, yet is troublesome and almost continual, whereas a consumptive Cough is mild in the beginning, and returns by Intervals, the Patient is thirsty, his Tongue foul, and loses his Appetite, and coughs after Meat, till he vomit it up: The Voice is hoarse, or squeaking, the Weight is greater in one part of the Breast than the other, and he coughs more, lying on one side, than on the other.

2. There is a Fever, Loss of Appetite, Thirst, reddish Urine, quick Pulse, red Cheeks, especially after Meat, Heat of the

20 *Of a Consumption.*

the Palms of the Hands, Soles of the Feet, and the *Hypochondres*.

3. Loss of the Muscular Flesh.

The Consequences of the beginning Consumption, I have been describing, which, if not cured, becomes a confirm'd one, which is attended with a new *Fever* of the *Inflammatory* kind, as *Pleurisie*, or *Peripneumony*, and afterward with a *Putrid* and *Intermitting Fever*, and then the *Cough* encreases, and vast Quantities of Matter is expectorated, sometimes sweet, and sometimes foetid, with Night Sweats, *Diarrhoea's*, swell'd Legs, sore Mouths, Pain in the Throat upon swallowing any thing, and at last the *Facies Hippocratica*, which terminates in Death.

§ 3. When any Evacuation is suppressed, whether it be the *Menses*, the *Hemorrhoids*, *Urine*, or the Matter of *insensible Perspiration*, &c. 'twill necessarily induce a *Plethora*, which if it cause not a *Fever*, as it often doth, will by its greater Weight upon the Vessels it circulates through, so *relax* 'em, as to render them less fit to carry on the Circulation; upon which account the Blood will not only pass through the capillary Arteries more difficultly, but be apt

to deposit a *slimy Mucus* upon any Part that is disposed to receive it. This greater Quantity of Blood, by distending the *Arteries* of the *Brain*, will in some measure intercept the Motion of the *Spirits* thro' the *Nerves*, and the greater Viscidity of the Blood, together with its diminish'd Celerity, will lessen the Quantity of *Spirits* separated in the *Brain* (by the 20th and 22d Propositions of *Animal Secretion*) therefore the Force of all the *Muscles* in the Body, and consequently of these serving *Respiration*, will be lessened. Now that this greater Quantity of Blood, which is also more Viscid, may pass with ease thro' the *Lungs*, 'tis necessary that the *Lungs* shou'd be more inflated, than at another Time: But on the contrary, in the present Circumstances, they will be less; for their Inflation depending on the Quantity of *Air* admitted into 'em, and that Quantity depending on the greater or less Enlargement of the Cavity of the *Thorax*, and this upon the Force of the *Muscles* serving *Inspiration*, which is prov'd to be less in this Case; therefore the Blood will be apt either to stagnate in the *Lungs*, and so cause *Inflammations*, which may end in *Ulcers*, or leave

behind it a slimy Matter, which will cause *Tubercles* in the *Lungs*, whereby the *Patient* will be enclined to cough, but not violently, because the *Tubercles* are not very troublesome; and there will be a Sense of Weight in the Breast, and a Difficulty of Breathing, especially upon quick Motion; for the same Reason, the Irritation to cough will be greater, and the Difficulty of Breathing encreased, by any thing that lessens the Cavity of the Breast, as a full Stomach will do, by hindering the *Diaphragm* from sinking in *Inspiration*; therefore upon *Eating*, the *Patient* coughs till he vomit, and so eases himself of the Burthen.

§ 4. If the *Tubercles* be only on one side of the *Lungs*, the Weight is perceiv'd there, and the *Patient* coughs more for lying on one side, than the other: The Blood being in this Viscid State, its Motion impair'd, and the Coats of the *Glands* relax'd, will encrease the Quantity of viscid Secretions above the Fluid, and also the Viscidity of the secern'd Matter (by the 15, 20, and 22d Propositions of Secretion) therefore the *Glands* of the *Stomach*, the *Asperia Arteria*, and those which empty their Contents into the Mouth, will
sepa

separate a Matter more Viscid than ordinary, and also in greater Quantity; from whence we may account for the Loss of Appetite, Thirst, and Foulness of the Tongue, and Hoarseness we observe in this Distemper; the Viscidity of the Blood encreasing, and the Quantity of *Animal Spirits* decreasing, the Orifices of the *Glands* will be mightily enlarg'd, and so a *Hectic Fever* will ensue (by Dr. Cheyne's Theory of that Distemper) and consequently the Patient will be thirsty, lose his Appetite, make reddish Urine, have a quick Pulse, red Cheeks after Meat, Heat of the Palms of the Hand, Soles of the Feet, and *Hypochondres*, with a Loss of the Muscular Flesh.

§ 5. Now if the Patient in these Circumstances, be left to the Tyranny of this Distemper, without any *Medical Assistance*, or be treated after such a manner as to encrease the Cause of his Distemper (as he generally is, with *Pectorals* and *Balsamicks*, which is the reason so few are recover'd from this Disease;) the Symptoms taken notice of in the last *Stadium*, or in a confirm'd Consumption, will immediately succeed: As a *new Fever* of the *Inflammatory kind*, &c. for the *Laxity* of the solid Parts

encreasing, as also the Viscidity of all the circulating Liquors, the *Tubercula* in the *Lungs* will grow larger every Day than other ; the Heat also encreasing, will dispose these *Tubercula* to inflame, and suppurate, which will occasion *Pleurisies*, *Inflammation* of the *Lungs*, and at last *Putrid* and *Intermitting Fevers*, when the Impostumation breaks. From this *Ulcer* in the *Lungs* will great Quantities of either sweet or foetid Matter, be expectorated by Coughing, and the Viscidity of the Blood being greater, and the Coats of the *Glands* being also more relaxed, a greater Quantity of concocted *Phlegm* will be separated (in those *Glands* which empty their Contents into the Mouth) either by *Hawking* or *Coughing* (by the foremention'd Propositions of Secretion) so that the Cough will grow worse, and the Patient will spit more ; and he will also be troubled with Night-Sweats, for the Pores of the Skin being mightily enlarg'd, and more so in Sleep, than when waking, and the Blood's Motion being accelerated by the Heat of the Bed ; upon both these Accounts Sweat will be forc'd, and if by any means this Evacuation be suppress'd, some other will be en-

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increas'd, which is generally that by the *Glands* of the *Intestines*, they being so much relax'd, and their Orifices so much enlarg'd, for which Reason a *Diarrhæa* and *Night-Sweats* do alternately waste the Patient's Strength; but if both these Evacuations be suppress'd, the detain'd Matter will fall upon these Parts where its Motion is slowest, and the Resistance to its Pressure is the least; now the *Legs* being at the greatest Distance, both from the Heart and Brain, and in the Day-time in a depending Posture, the Motion of the Blood will be there the slowest, and the Tensity of the Fibres the weakest: Whereas a sufficient Degree of Tensity is requir'd to resist the distending Force of the circulating *Humors*; therefore the *Legs* will swell, when these Evacuations are suppress'd. The Coats of the *Glands* being yet more relax'd, will not be able to press out their Contents, whereby *Tumors*, and sometimes slight *Ulcerations*, will succeed, so that the Mouth will be sore, and the Throat pain'd upon swallowing.

§ 6. I've now, as briefly as I cou'd, accounted for the Production of a *Consumption*, by the Suppression of some

natural Evacuation, and could as easily shew how 'tis brought about by the rest of the *Procatartick* Causes assign'd; but this would run me quite beyond my Design, and perhaps I may find a fitter Opportunity of doing it, being furnish'd with a good Stock of *Observations* of Cures perform'd in this Distemper, by a Method and Medicines vastly different from what is commonly practis'd and prescrib'd.

§ 7. I shall only now examine how well the present Practice, by *Pectorals*, and *Balsamicks*, answer the Indications taken from the preceding *Theory*: The Indications are principally to render the *Humors* more *Fluid*, the *Fibres* more *Tense*, and to evacuate the *Viscid Phlegm*, with which the *Glands* of the Stomach and those about the Mouth are stuff'd, lest by a longer stay the *Glands* be still further relax'd.

The common *Dispensatory Pectorals* are the *Decoct. Pectorale*, *Syr. Botryos*, *Capil. Veneris*, *Glyceriz. Hysop*, *Scabiosa*, *Mel. & Oximel Scilliticum*, *Succus Glycerizæ*, *Loboc de Caulibus*, *Farfar*, *Papavera*, *Basil. Pino*, *Portulac. Sanans*, *Diacod. Spec. Diatragacant. Frigid. Pulv. Haly*; and the most famous *Simples* are *Sugar*, *Honey*,
and

Of a Consumption. 27

and *Liquorice*. Now all these, except the *Mel. Oximel Scillit.* and *Syr. Scabiosæ* (which are all Vomits) are *sweet, slimy Mucilages*, and are therefore directly contrary to the *Indications* in this *Distemper*; for they will both *relax* the *Solid Parts*, and thicken the *Fluid*, they will fill the *Stomach* with a glutinous Slime, which will mightily *pull* the *Appetite*, and weaken *Digestion*, and they will also encrease the *Thirst*: Whereas the *Medicines* proper in this Case, shou'd *contract* the *Solid Parts*, *attenuate* the *Fluid*, and *evacuate*, at due *Intervals*, the *Viscid Matter* lodg'd in the *Glands*; therefore gentle *Emetics*, mild *Stomachics*, moderate *Exercise*, especially by *Riding*, according to *Dr. Sydenham's* Observation, a clear dry *Air*, the Use of the *Cold Bath*, provided the Patient stay but a little time in at once, and the *Distemper* not far advanc'd, *Blistering Plaisters* frequently apply'd, with a Diet of *easy Digestion*, will best answer our Expectation in the Cure of a beginning *Consumption*: But when the Disease is arriv'd at its last *Stadium*, nothing but Death is to be expected: The best that a *Physician* can do in this Case, is only to mitigate the Symptoms, in order to make the Remains

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of Life more comfortable. Yet 'tis not easie, even in this *Stadium* of the Distemper, to make certain and infallible *Prognostics*: I've more than once been deceiv'd in the Recovery of a Patient, whose Symptoms gave not the least Encouragement to expect it. The first Case was of a *Baker* (and *Bakers*, according to *Ramazini's* Observation (g), are subject to this Distemper, which thing I've also my self observ'd) who had been troubled with a *Cough* for above Twelve Months, which gradually encreased, till he was in the following Condition. When I first visited him, his Stomach was lost, his Thirst very great, his *Urine* red, and let fall a *Late-ritious* Sediment, his Tongue foul, sweat prodigiously every Night, cough'd almost continually, and expectorated vast Quantities of concocted *Pus* with Streaks of Blood in it, which often smell'd obominably: His Flesh was gone, and by reason of Weakness, was scarce able to rise from his Bed: In this deplorable Condition, at his earnest Desire, I ordered such Things as I thought most fit

(g) De Morbis Artificum, p. 184.

to mitigate the Symptoms, without giving him the least hopes of a Recovery ; but contrary to my Expectations, the next time I saw him, which was about a Week after, he was much better, and by a strict observance of Directions, in a Month's time was fit for Drinking the *Chalybeat Waters*, which I order'd him, and thereupon he recover'd without Relapse. The Medicines that recover'd him were such as were indicated by the foregoing *Theory*. And as for *Balsamics*, they are useful in this Distemper, in as much as they are *Stomachics*, or *Diuretics*, in which Virtues they may easily be improv'd by *Acid* or *Saline* Mixtures ; for by themselves, if taken in considerable quantities, they generally both *pall* the Stomach, and *heat* the Blood, and so rather promote than abate the *Symptoms* of this Distemper : But for the ends for which they are usually prescrib'd, they are altogether improper ; for were they immediately apply'd to the Ulcerated Part, they would be of little advantage ; for the same reason they are discarded the Practice of *Chyrurgery*, by the most Skilful in that Art : But so far are they from being immediately apply'd to the Part affected, that but little of them enter the

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the Mass of Blood, and that very much alter'd from what they were when taken in at the Mouth. All *Balsams* whatsoever are much more *Viscid* than the Matter separated in any of the *Glands*, and the *Viscid*ity of the separated Matter being as the number of *Plications* in the complicated Artery (*by the 2d Corol. of the 9th Proposition of Secretion*) therefore to separate a Liquor more *Viscid*, than what is separated in any other of the *Glands*, as *Balsams* are, the *Intestines*, which answer to the Artery, ought to be more complicated, than any Artery of which a Gland is compos'd; whereas the *Testiculus Humanus* is 50 times more complicated than the *Intestines*; for the *Plications* of the *Intestines* are not above 96, as (k) Dr. *Cheyne* hath observ'd; and those of the *Testiculus Humanus* are 4800, for (l) *Belini* tells us, the length of the complicated Artery of the *Testiculus Humanus* is 300 Ells, and the Altitude $1\frac{1}{2}$ Ell; therefore the number of *Plications* must be 4800. Now as 96. 4800. 1. 50. therefore if *Balsams* were only of equal *Vis-*

(k) *New Theory of Fevers*, p. 50.

(l) *De motu Cordis*, Pro. 40.

Of a Consumption. 31

acidity with the Matter separated in the *Testicles*, the *Guts*, in order to separate them into the *Lacteals*, must be either 50 times longer, that they might be 50 times more complicated, or the *Balsams* must be made 50 times more Fluid, and hereby lose all the Properties of *Balsam*. So that *Balsamicks*, as such, can never come at the Part affected, and therefore never heal it.

Some will be apt to imagine from what I've said, that I assign too small Diameters to those Particles of *Chyle* which enter the *Lacteals*, whereas they are no smaller than what's necessary for the preservation of our Lives and Healths; for was any Particle of indissolvable solid Matter, such as *Stones*, or *Minerals* (both which are us'd in Medicine) to enter the *Lacteals*, and if the Diameter of such Particles was greater than the Diameter of the smallest Vessels in a Humane Body, they would obstruct 'em, and cause *Inflammations*, *Gangrenes*, and *Death* at last. Now *Leeuwenhoek* with his *Microscopes*, hath discovered Vessels in a Humane Body, whose Diameters are 79200 times less than an Inch, and so small at least ought the Diameters of the *Lacteals* to be.

Cor.

Cor. 1. Hence we may see how necessary 'tis, that all hard, solid Medicines, (such as *Steel* and *Testaceous Powders*) shou'd be finely Levigated, if we expect any advantage from them in the Blood.

Cor. 2. That these Medicines, as they are commonly prepar'd, only exert their Force in the *Prima Via*, and are of no use to correct the suppos'd *Luxuriant Acids* in the Blood.

CHAP. IV.

Of a Dropsie.

A Dropsie is a watry Swelling, either of the whole Body, or part of it. 'Tis divided into two Species, viz. the *Anasara*, and *Ascites*. In the first, the Tumor is most in the Legs, and receives the Impression of the Finger, but the Pit remains not so long as in a *Lencomphegmac*y: The Urine is sometimes pale and plentiful, the Patient hath no Thirst, tho' he lose his Appetite. In the *Ascites* the Tumor is in the Legs, Thighs, Belly, and *Scrotum*, the Water is forc'd sometimes into the Cavity of the *Abdomen*, and at other times into Vessels it forms it self, either from some dilated Membrane, or obstructed *Lympheduct*. The Water is of various Colours; 'tis Salt, *Lixivious*, a little Corrosive, and Frothy, when mix'd with common Water: The Urine is red, lets fall a red Sediment, and little in quantity: The Thirst is excessive, and the Appetite very little.

The

The Antecedent Causes are much the same with those of a *Consumption*, excepting such, as more especially respect the *Lungs*, which is the reason that determines the preceeding Disorder to a *Consumption*, rather than a *Dropsie*; for whatever preceeds either a *Consumption* or *Dropsie*, disposes the Humors to be viscid, and the Fibres lax: The Laxity of the Fibres in a *Dropsie*, is both greater and more universal than in a *Consumption*, and the Motion of the Blood so slow, that *Perspiration* is almost intirely suppress'd, so that a load of *Serum* will be thrown on such Parts as are fittest to receive it: And these are such as are *depending* and most lax, such as the *Legs*, *Thighs*, and *Viscera*. The *Ascites* seldom happens without some fault in the *Kidnies*, or a preceeding *Jaundice*, Tumor in the *Liver*, or some other of the *Viscera*, whereby the *Lymphatic Vessels* are either mightily distended or broken: But the *Jaundice* and these Tumors may easily be produc'd by lax Fibres, and viscid Blood. (m) *Dóleus*, and (n) Dr. *Leigh* have both observed the *Omentum*

(m) *Encyclopedia Medicinz, &c.* p. 364.

(n) *Exercitatio de Hydrope.*

in Dropsies either full of Tumors, or else putrify'd; and 'tis from this Observation among some others, that *Doleus* supposes a Passage from the *Stomach* to the *Bladder*: But these Tumors may as well be the effect, as cause of the Distemper; for even the *Jaundice*, Tumors in the *Liver*, *Spleen*, *Pancreas*, *Mesentery*, *Omentum*, &c. may (by such a state of the Solids, and Fluids, as I've assign'd) be produc'd, as I have observed before. As the Viscidity of the Blood daily increases in *Consumptions*, for the reason assign'd in the preceding Chapter: So in this Case the Blood grows every Day more watery; for the Laxity of the Fibres being so very great, and the Motion of the Blood so slow, the complicated Arteries of which the Glands are compos'd, cannot be sufficiently *distracted*, and therefore will separate very little from the Mass of Blood: So that the quantity of *Serum* will continually increase, and the Motion of the Blood being so slow, the Fibrous Parts will retire into the middle of the Canals, in which it moves, even as it doth, when taken into a Porringer, and force the *Serum* against the sides of the Vessels, till the Pressure become such

as

as to drive the *Serum* thro' the Pores of the Vessels, and lodge it in their *Interstices*: Or else so dilate some of 'em as to form *Vesicles* to contain it.

From these short Hints I've given about this Distemper, 'tis evident that the Cure of a beginning *Dropsie*, is to be attempted by such means as strengthen the *relax'd Fibres*, render the Humors more Fluid, encrease the Celerity of the Blood's Motion, and promote some or all the *Secretions*, of which that of *Urine* and *Perspiration* are the best adapted to answer our Expectation: But in most *Hydropic Cases*, 'tis very difficult to encrease any of the *Secretions*, and especially that of *Urine*. When the *Prima Via* are obstructed, *Urine* is better promoted by gentle *Purges* than *Diuretics*, and I have found that Preparations of *Tartar* best answer this end; and that when the *Stomach* and *Guts* are well cleansed, an *Infusion* of *green Tea* in *Rhenish Wine*, is not only a good *Diuretic* and *Stomachic*, but encreases the Celerity of the Blood's Motion, and at the same time abates the Thirst, whereas all other *Bitters* I've yet try'd, encrease it.

Dry Food, *Diuretics*, *Diet-Drinks*, *Exercise*, tho' never so violent, provided it
wea-

weary not the Patient too much, a *dry Air*, the *Cold Bath*, and *Pleasant Company*, are of a greater Necessity in the Cure of this Distemper, than any sort of Medicines without 'em.

Dr. *Willis* tells us of some cured of an *Anasæra*, only by removing their Habitation from a Foggy to a Dry Air; and I question not, but that several Distempers may be as *safely* and *pleasantly*, tho' not so speedily cured, by a regular Use of the *Non-Naturals*; as by any means whatsoever.

C H A P. V.

Of Acute Distempers, and in particular of a Fever.

§ 1. **A** *Cute Distempers*, whether they be *Fevers*, *Pleurisies*, *Rheumatisms*, *Collicks*, &c. especially those attended with *Pain*, generally proceed either from a too great *Contraction* of the *Solid Parts*, too *violent Motion* in the *Fluid Parts*, or both these together.

§ 2. Dr. *Cheyne*, in his *New Theory of Fevers*, hath prov'd at large, that the general Cause of *Acute Fevers*, is an *Obstruction* or *Contraction* of the *Glands*, whereby the Quantity of *Blood*, and *Liquidum Nervorum*, is encreas'd; from whence all the Symptoms of *Fevers* may be accounted for.

§ 3. If the *Pain* be great, especially in *Membranous Parts*, it will either cause or encrease a *Fever*, for it is always attended with a *Contraction* of the pained Part (as is evident from the
Belli-

and particularly of a Fever. 39

Bellinian Doctrine (o) *de Stimulis*) and by this *Contraction*, the Motion of the Blood and Spirits is either totally obstructed or retarded, and the Part swelled, and by their Pressure against the sides of the containing Vessel, more forcibly, as they will, when their direct Motion is hindered, the Pain is both encreased and propagated further, and the *Contraction* is more or less communicated to all the Parts of the Body, whereby *Secretions* are stopped, and the Quantity of Blood encreased, which will either cause or encrease a *Fever*. Besides, Pain, which is a *Stimulus*, makes more dense and strong Vibrations of the Solid Parts, and so divides the Blood into smaller Parts, which must therefore take up more Room; for the *Surfaces* of Bodies, upon their Division, do not decrease so fast as their *Solidities*, these being in a *triplicate*, as those are in a *duplicate Proportion*, to their Diameters: so that the more Bodies are divided, the more sensible Space they fill: And this is all one, as if the Magnitude of the Particles had continued the same, and the Quantity been encreased, see-

(o) Bel. de Urin. & Pulsibus, p. 165.

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ing all the Effects of an encreased Quantity are hereby produced.

§ 4. This greater *Fluxility* of the Blood will supply a greater Quantity of *Animal Spirits*, as is known to any who understand the Nature of *Secretion*, and being that a *Fever* is but the encreased *Circulation of the Blood*, and the *Velocity* of the Blood's Motion being in compound proportion of the Frequency and Strength of the Heart's Contraction directly, and the *Resistance* it meets with reciprocally, and these depending upon the Quantity of *Animal Spirits* serving for the Contraction of the Heart; and the *Resistance* being less, from the greater *Fluxility* of the Blood, therefore the greater *Fluxility* of the Blood will cause, or encrease, a *Fever*.

§ 5. I shall now shew, how the most obvious *Symptoms* of a *Fever* are accounted for, from the too great *Velocity* of the Blood.

§ 6. The Pulse in a *Fever* is strong, or quick, or both; the Patient is hot, and dry, and restless; he is thirsty, his Tongue is foul or dry; he is watchful, then delirious, convulsed, and the Pulse is now weak and intermitting, and then the Patient falls into cold Sweats, and dies.

§ 7.

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§ 7. The Blood cannot move more swiftly thro' the Arteries, unless the Heart contract more frequently, more strongly, or both; now the Dilatation of the Arteries, or the Pulse, keeps time with the Contraction of the Heart, and is more or less *dilated*, as the Heart is more or less *contracted*; therefore if the Celerity of the Blood be greater, the Pulse must be *quicker*, or *stronger*, or both.

§ 8. The Blood moving more swiftly, every part of the Body will receive a greater Share of it, in the same Space of Time, than it would have done, had it mov'd more slowly: The Blood being always hot (be it from what Cause soever it will) therefore every part of the Body receiving a greater Quantity of Blood, will be sensible of a greater Heat. And this Proposition may so easily be demonstrated, that I shall not stay upon it, *viz.* *That (cæteris paribus) the Heat of an Animal is in compound Proportion of his Quantity of Blood, and the Celerity of its Motion.* There may several other Things contribute to the greater Heat of the Patient; but this is certain, and evident from an encreased Celerity.

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§ 9. This great Heat will make him both *dry*, by evaporating the thin Parts, and *restless*, or which is all one, to change his Posture frequently, in order to ease himself of the Torment he endures.

§ 10. This Heat will also act as an universal *Stimulus*, whereby all the Glands will be straitned, and consequently the fecern'd Matter will be thinner or more fluid, and the remaining part of the Blood more solid, than in a natural State; therefore he will be *Dry* as well as *Hot*.

§ 11. The gross Parts of the Blood being retained in this Condition, it is therefore more Viscid; besides its Viscidity is encreas'd by its Heat, as is known by Experiment: for if you apply a much less Degree of Heat than will boil Water, it will turn the *Serum* into *Gelly*. The Heat of the Blood is greater, in *Fevers*, than most imagine. The Heat of a Man's Skin, whose Pulse beats sixty Strokes in a Minute, is to the Heat of boiling Water, as 16 to 52, as appears by the *Thermometer*, so that boiling Water is but little more than three times as hot as the Blood of a healthy Man. Now if the Heat of the Blood should
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increase in proportion to the Frequency of the Pulse (as it must if the Pulse beat with the Strength it did, and generally it is stronger :) A Man then whose Pulse beats 195 Strokes in a Minute, would be as hot as boiling Water ; and it is common for a *Feverish* Pulse to beat a 120 Strokes in a Minute. Hence we may account for the *Syziness* of the Blood in *Pleurisies*, and other *Inflammatory Distempers*, and so be rescued from the dangerous Practice of those, who, because they observe themselves, or have been told by others, that *Volatile Salts*, and *Spirits*, such as *Hartshorn*, *Sal Armoniac*, &c. will dissolve the *Serum*, when coagulated by an *Acid* ; therefore prescribe these hot, stimulating Medicines, to the imminent Hazard, if not Destruction, of their Patients. And this they do, from a mistaken *Hypothesis*, that the *Syziness* of the Blood is owing to a *Coagulating Acid*. The contrary to which Dr. *Pitcarne* hath proved in one of his Dissertations (p).

§ 12. The Blood will then be made viscid upon several Accounts ; and from

(p) Dissertatio de Opera quam præstant corpora, &c.

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this viscid Blood will be separated a less Quantity of *Saliva*, and that more slimy than in a natural State; the Quantity of secreted Matter being in a reciprocal Proportion to the Viscidity of the Blood, by the 17th Proposition about *Animal Secretion*: And also because the greatest Quantity of *Saliva*, is separated when the Blood moves the most slowly, as appears by making a Ligature upon the *Jugulars*. Hence both the Foulness and Dryness of the Tongue.

§ 13. The Orifices of the Glands being straitned by the stimulating Heat, the Quantity of *Saliva* will still be less; and the Heat speedily evaporating the most fluid Part of it, the whole Mouth must be exceeding dry; whence proceeds that unquenchable Thirst Persons complain of in *Fevers*.

§ 14. This greater Velocity of the Blood, will send a greater Quantity into the Brain, in a given Time: And an encreased Velocity encreaseth the Fluid Secretions, more than the Viscid, by the 20th Proposition of *Secretion*. The *Animal Spirits* being the finest of any secreted Matter, the *Exility* of their Parts rendring them invisible. Therefore

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fore upon both Accounts an encreased Velocity of the Blood will encrease the Quantity of *Animal Spirits*. Their Quantity being greater, the *Nervous Tubes*, and all the Motory Fibres, will be fuller and more *Tense*, whereby *Sensation* will be stronger. Now since it is a necessary Requisite in *Sleep*, that the Fibres should be *relax'd*, and the *Animal* void of Sensation, and being neither of these can happen when the *Animal Spirits* are separated in greater Quantity, as they will be, when the Blood moves more swiftly; therefore the greater Velocity of the Blood will prevent *Sleep*, or the Patient will be watchful.

§ 15. And he will be also *Delirious*; for the Nerves being fuller of *Liquor*, its *Undulations* will be more *dense* and *quick*, Sensation will be more lively, and less Impulses upon the Extremity of the Nerves will cause it. And the more lively any Impression is, the greater Attention the Soul bestows upon it: Whether it be attended with Pain or Pleasure; and so more regardless of former *Ideas*, being entirely imploy'd about the present Sensation. Now observe a Person in this Condition, whose Senses
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are so quick, that the most trivial Object will affect him : Suppose him so intent upon the present Objects, as to mind nothing else, and to speak of what he observes, just as *Ideas* come into his Mind, without exercising his Judgment, in comparing them with former *Ideas* laid up in his Memory ; his Talk must needs be incoherent, or, in other Words, you will say, he is *delirious*.

Besides this, the Blood having acquired a greater Solidity, by the Evaporation of its thin Parts, and its Celerity being so much encreased, the Strokes upon the Extremity of the Nerves will be much stronger, whereby the *Reflux* of the *Nervous Fluid* to the Brain, will be as quick, as if the Motion of the Blood was slower, and the Nerves were struck upon by *Effluvia* from external Objects ; so that the same *Ideas* will be excited, as if those Objects were really present ; and the Actions of Men being always suitable to the *Ideas* they have, there will be such Actions as are produc'd by external Objects, when none such are present ; such as those consequent upon *Joy, Fear, Anger, Revenge, &c.* In this case the By-standers will
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conclude they act irrationally, or are *delirious*.

§ 16. *Convulsions* are nothing but the *Involuntary* Contraction of the Muscles. The Muscles are contracted by an *Ebullition* of the Arterial Blood, and Animal Spirits. The Animal Spirits are derived into the Muscles, by the Command of the *Will*, or by shaking of the Nervous *Tubes*, thro' which they are convey'd. How the Nerves may be shaken, and that irregularly too, in the suppos'd Circumstances, is evident from the last Section: but *Convulsions* from this Cause are generally strong, and happen not so often as the other I am about to account for, which is called *Twitching*, or a *Subsultus Tendinum*, and they are caused after this manner.

The Celerity of the Blood's Motion, and its Heat continuing, must at length render it so viscid, that few, or none, of the Particles are small enough, to enter into the narrow Orifices of the Nerves; the Supply of Spirits being hereby cut off, their Quantity will continually decrease, till it be so small as not to keep the *Antagonist* Muscles equally contracted. The Entrance of more Spirits into that Muscle is not only prevented,

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vented, but the Spirits remaining in that Nerve, which terminated in the contracted Muscle, are forced back into that Place where there is the least Resistance, and that is the *Antagonist* Muscle, being now relax'd, whereby that Muscle is contracted, and the other relax'd, and so alternately ; and since the Quantity of Spirits is so small, the Contraction of the Muscles will be very weak, and the Convulsive Motion will be a sort of *Trembling*, or *Twitching*.

The Influx also of the Spirits into the Nerves, by the Pulsation of the Arteries, being alternate, so would their Efflux through the Emissary into the Muscles, were it not for the Fulness of the Nerves, whereby the Efflux becomes continual ; therefore when the Nerves are much emptied, the Efflux will be sensibly alternate : Whereby the Muscle will be alternately contracted, or there will be *Twitchings* of the *Tendons*.

§ 17. The Patient in this Condition, hath a weak and interrupted Pulse, and in a cold Sweat.

The Pulse is weak, by the Defect of Spirits to contract the Heart, and because the Blood grows still more Viscid,
by

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by losing its Serum in Sweat, its Motion through the Arteries must be slower; whereby the Resistance to the Contraction of the Heart will be greater. Therefore a greater quantity of Spirits must be derived into the Heart, to overcome this greater Resistance, and so a longer time must be spent before the Heart be contracted, or the Interval between the two Pulsations of the Artery will be greater. But the Resistance being overcome, and the Contraction of the Heart being stronger, caused by a greater quantity of Spirits derived into the Heart in a longer time, the Contraction will be quick as usual, till the increased Resistance put a new stop to it, or the Pulse will intermit.

§ 18. The deficiency of Spirits must needs relax all the Fibres, so that the Pores of the Skin will be exceeding wide, and therefore the Patient will sweat; and because the Motion of the Blood is so very slow, the Heat of the Blood, and consequently of the Sweat, will be less than that of a healthy Person, for which reason he will judge it *Cold*.

§ 19. The Spirits still wasting, and the Viscidity of the Blood encreasing, at length they will be unable to contract

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tract the Heart, and so the Circulation of the Blood will cease, or in other words, the Patient will die.

§ 20. From hence we may conclude how fit they are to be trusted with the Patient's Life, who instead of *curbing* the too *impetuous Motion* of the Blood with *cooling Diluters*, and *moderate Evacuations*, do *spur* it on faster, with their heating *Cordials* and *Alexipharmics*.

Though I have not attempted to explain every *Phænomenon* in the Distempers I have mentioned, (for that would have run me quite beyond my present Design in this short Essay) yet from what has been said, may be drawn several Practical *Corollaries*, to direct us in a more rational Method than that which is too commonly, and every body knows, but too *unsuccessfully* practis'd.

CHAP. VI.

Of the Air.

§ 1. **T**HE *Air* which we continually breathe, and which constantly environs us, must needs impart its benign, or baneful *Influences*, according to the various Changes it undergoes, as to its *Gravity*, *Elasticity*, *Moisture*, *Dryness*, *Heat*, or *Coldness*; or as it has more or less foreign Particles, such as *Mineral*, *Vegetable*, and *Animal*, floating in it.

The *Air* is a compressible and dilatable *Fluid*, covering the Earth and Sea to a considerable Height, the lower Parts being always more compress'd than those above, and the Spaces into which it may be compress'd are always reciprocally proportional to the compressing Weight; and because its Density is proportional to its Compression, its Particles do recede from each other, with Forces reciprocally proportional

tional to the Distances of their Centers, as Sir *Isaac Newton* hath demonstrated (q).

§ 2. That the *Air* is really heavy, was first found out by *Galileus*, by trying to what height Water might be rais'd by Pumping; and when he found it could not be rais'd higher than thirty five Foot, concluded that it was from the Counter-balance of the *Air's* Weight that it was rais'd so high, and not from an imaginary *Fuga Vacui*.

§ 3. The Specifick Gravity of *Air* to *Water*, according to Mr. *Boyle's* Experiments, is as 1 to 1000, but comparing this with the Observations of Mr. *Halley* and Sir *Isaac Newton*, 'tis perhaps nearer the Truth to assign the Density of *Air* to *Water*, as 1 to 800, and the Density of *Mercury* to *Water* being as 14 to 1, the Density of *Air* to *Mercury* will be as 1 to 11200; so that the *Air* we breathe in, takes up 11200 times the space that the like quantity of *Mercury* would: And yet (r) Mr. *Boyle* hath found by Experiments, that the *Air*,

(q) Principia Philo. Mathem. p. 23. L. 2.

(r) Tracts about the admirable Rarefaction of the Air.

without any *adventitious* Heat, may, by the Force of its own Spring, possess *thirteen thousand times* the Space it doth when pressed by the incumbent *Atmosphere*, and therefore may possess a Space *one hundred and forty five Millions and six hundred Thousand times* greater than the same Weight of *Mercury*, and by the addition of Heat it may be forced to fill a Space much larger. Now if we consider that the *Air* we breathe in may be compressed into 40 times less Space than that which now it fills, it may then possess a Space *five hundred and twenty thousand times* greater at one time than at another, for $13000 \times 40 = 520000$.

§ 4. This *Fluid* I have been describing, is so necessary, that an Animal cannot live a few Moments without it, as is evident from Experiments of their sudden Death in the *exhausted Receiver*; as also for this Reason, that so soon as the Blood ceaseth to *circulate*, the Animal dies: And it cannot circulate thro' the Body, unless it pass the *Lungs*, which it cannot do so long as they are unblown up. And it is only the *Air*, which, by its *Weight* and *Spring*, is able to dilate the *Trachea*, and puff up the little *Air*
F
Blad.

Bladders, whereby the sides of the Blood-Vessels are drawn asunder, and room made for the Passage of the Blood thro' the *Lungs*. And yet if the *Air* by its greater Gravity, or Spring, should distend the Branches of the *Trachea*, and swell the *Air Bladders* above what is necessary to increase the Diameters of the Blood Vessels to their greatest length; it wou'd then, by taking up too much room, press the sides of the Blood Vessels together again, and so either retard or obstruct the Motion of the Blood through the *Lungs*. I shall transcribe some Propositions (*ex iis, quæ in prima parte respirationis, &c.*) of Bellini in his Preface to his Book *de Urinis & Pulsibus, &c.* to confirm my own Reasoning on this Head. *Propositio 22. 'Sanguis fluere per Pulmones debuit, nec potuit iis non inflatis, potuit tamen per reliqua Viscera.*

P. 23. 'Ducto in pulmonem aere ejus momenti, quod ramis tracheæ ad obtusum angulum convertendis, inflandisq; folliculis sufficiat, non tamen tanti, quod per nimiam folliculorum extensionem iis advolatos canales sanguinis occludat, totus pulmo simul inflabitur, & sanguis per ipsum fluat.

P. 24. ' *Sanguis nihil patitur ab Aere, cujuscunq; momenti sit, dum in pulmone ducitur, neq; cum redditur, si minoris, aut majoris momenti fuerit: at vero cum expiratur aer momenti mediocris, tum sanguis ab ipso solvitur in minimas partes, & quidem sub ipsum expirationis initium, nihil deinde patiens per totam reliquam expirationem.*

P. 25. ' *Aer aequo rarior, & aequo densior non est idoneus respirationi, & utervis respiretur inter varias, & plures affectiones, brevi animal moritur.*

§ 5. Let us now consider what happens upon the Inflation of the *Lungs*.

There is hereby room made for the Blood to pass through the *Lungs*, which it cou'd not do before; so that were the *Lungs* to continue in this inflated Condition, there would be nothing to obstruct the Motion of the Blood through them, with whatsoever Celerity the Contraction of the right Ventricle of the Heart wou'd propel it.

Now the *Air* cannot remain in the *Lungs* without being much heated, and thereby have its Spring *unbent*, and so become specifically lighter than the external *Air*. For which Reason it will, by a known Principle in *Mechanics*, give

place to it, and rise to such a height, as till it meet with *Air* of its own Weight, and there it will remain.

Supposing then the *Lungs* always blown up, yet there would be a constant Supply of fresh *Air*, for all the Purposes the *Air*, as such, can be useful.

Therefore they are mistaken, who think that Respiration (*viz.* an alternate Inflation and sinking of the *Lungs*, together with a Contraction and Relaxation of the Muscles serving Respiration) is perform'd in an *Animal*, for the end the Blood may *circulate* thro' the *Lungs*; or that the *Air* may hereby blow up the flame of Life, or *ventilate* and cool the too hot Blood in its Passage through the *Lungs*, or carry off the *fuliginous* Parts of the Blood; nor yet to impart its *Nitrous Salts* to dissolve the Blood, nor its *Elastic Particles* to communicate an *Oscillatory Motion* to the Blood: Some of these being generally suppos'd as the end of Respiration. For all these ends may be obtain'd, even whilst the *Lungs* remain inflated: Therefore *Nature*, which does nothing in vain, never design'd Respiration for any of these ends, which may be accomplish'd as well without it.

§ 6. Now, since in Fact there is such a Thing as Respiration, let us observe what will happen, when by any means whatsoever, the *Air* is forc'd out of the *Lungs*.

§ 7. The Sides of the Blood Vessels, which by the Inflation of the *Lungs*, were drawn asunder, will now, the *Lungs* being crowded on a heap, be forc'd together, and so the Blood contain'd in them, broken, and divided into innumerable small Parts, and thereby render'd more fit to pass the several *Strainers* of the Body.

§ 8. From what hath been said, it follows, that *Air* either too *dense* or *rare*, (tho' it be not to such a degree as to become Mortal) as it is unfit for Respiration, so must necessarily be unhealthful, and consequently the highest Hills are unwholsome, as well as the lowest Vallies.

§ 9. And as the Blood upon this score must be less broke and divided, it will dispose to all those Distempers which proceed from a too great Viscidity therein.

But there is scarce any *Chronical Distemper* but which may either derive its Original from, or owe its Growth to this

Cause : As the *Faundice*, *Cachexy*, *Drop-sie*, *Asthma*, *Ague*, and the *Hypochondriacal Illness*; and there is no Distemper wherein the change of *Air* is more useful than in *Consumptions*, sometimes doing more than any Medicine whatsoever could perform without it.

§ 10. Our Bodies are equally press'd upon by the incumbent *Atmosphere*, and the weight they sustain is much greater than is commonly imagin'd, being equal to a *Cylinder* of *Air*, whose *Base* is equal to the *Superficies* of our Bodies. Now a *Cylinder* of *Air*, of the height of the *Atmosphere*, is equal to a *Cylinder* of *Water* of the same *Base*, and 35 Foot high, as appears by *Gallileo's* Experiment of Pumping : So that every square Foot of the *Superficies* of our Bodies, is press'd upon by a weight of *Air* equal to 35 *Cubical* Feet of *Water*, and a *Cubical* Foot of *Water* being found by Experiment to weigh 76 Pound Troy Weight; therefore the compass of a Foot square upon the *Superficies* of our Bodies, sustains a quantity of *Air* equal to 2660 Pounds weight, for $76 \times 35 = 2660$, and so many Foot square as there is upon the *Superficies* of a Body, so many times 2660 Pounds Weight does that Body

Body bear. So that if the *Superficies* of a Man's Body was to contain 15 square Feet, which is pretty near the Truth, he wou'd sustain a Weight equal to 39900 Pounds Troy, for $2660 \times 15 = 39900$, which is above thirteen Tun,

§ 11. The difference of the Weight of the *Air* that our Bodies sustain at one time more than at another, is also very great. The whole Weight of *Air* which presses upon our Bodies when the *Mercury* is highest in the *Barometer*, is, as I have already prov'd, equal to 39900 Pounds Troy. I shall now prove that the difference between the greatest, and the least pressure of the *Air* upon our Bodies, is equal to 3982 Pounds Troy.

The difference of the *Air's* Weight at different times, is measured by the different height to which the *Mercury* is buoyed up in the *Barometer*, and the greatest variation of the height of the *Mercury* being three Inches, a Column of *Air* of any assignable *Base* equal to the Weight of a *Cylinder* of *Mercury* of the same *Base*, and the Altitude of 3 Inches will be taken off from the pressure upon a Body of an equal *Base*, at such times as the *Mercury* is three Inches lower in the *Barometer*. So that every Inch

square of the Surface of our Bodies is press'd upon one time more than another, by a Weight of Air equal to the Weight of 3 Cubical Inches of Mercury. Now a Cubical Foot of Water being 76 Pounds, a Cubical Foot of Mercury must be 1064 Pounds equal to 102144 Drams. And as 102144 Drams is to a Cubical Foot, or which is all one, 1728 Cubical Inches :: $59\frac{17\frac{1}{2}}{28}$ Drams to one Cubical Inch. So that a Cubical Inch of Mercury (throwing away the Fraction which is inconsiderable) is equal to 59 Drams, and there being 144 square Inches in a Foot square, therefore a mass of Mercury of a Foot square Base = to 144 square Inches, and 3 Inches high, must contain 432 Cubical Inches of Mercury, which being multiplied by 59 (the number of Drams in a Cubical Inch of Mercury) makes 25488 Drams, and this Weight does a Foot square of the Surface of our Bodies sustain at one time more than another. Suppose again the Superficies of a Human Body equal to 15 square Feet, then wou'd the Body sustain at one time more than another, a Weight

$$= 15 \times 25488 = \frac{382320}{8} \text{ Drams} (=$$

$\frac{47790 \text{ Ounces}}{12} = 3982\frac{1}{2} \text{ Pound Troy.}$

§ 12. Now it is so far from being a wonder that we sometimes suffer in our Health by a Change of Weather, that 'tis the greatest, we don't always so; for when we consider that our Bodies are sometimes press'd upon by near a Tun and a half Weight more than at another, and that this Variation is often very sudden; 'tis surprizing, that every such Change should not entirely break the Frame of our Bodies to pieces, and be the constant Harbinger of sudden Death. One wou'd think that when so many of the Vessels of our Bodies are straitned by an encreased Pressure, that the Blood would stagnate up to the very Heart, which not being able to contract it self, the Circulation wou'd cease, and we shou'd die. But such is the Contrivance of infinite Wisdom, that when the Resistance to the circulating Blood is greatest, the *Impetus* by which the Heart contracts, shou'd be so too: The Weight of the *Air* encreasing, the *Lungs* will be more forcibly expanded, and hereby the Blood more intimately broken and divided, so that it becomes fitter for the most fluid Secretions, such as that of *Animal Spirits*, by which the Heart will be more strongly contracted. The
Blood's

Blood's Motion towards the Surface of the Body being obstructed, it will pass in greater Quantity to the *Brain*, where the Pressure of the *Air* is taken off by the *Cranium*: And upon this Score more Spirits will be separated, whereby the Heart will be so strongly contracted, as to carry on the *Circulation* thro' the passable *Canals*, whilst some others are obstructed.

§ 13. There will be one considerable Alteration made in the Blood, upon the *Air's* greater or lesser Pressure on the *Surface* of our Bodies, viz. the Blood will be more or less compact, will be crowded into a less, or possess a greater Space in the Vessels it runs in. For the *Air* contain'd in the Blood, always keeps its self in *Æquilibrio* with the external *Air* that presses upon our Bodies; and this it does by a constant *Nisus* to unbend it self, which is always proportional to the compressing Weight by which it is bent: So that if the Compression or Weight of the *circum-ambient Air*, be never so little abated, the *Air* contain'd within the Blood unfolds its Spring, and forces the Blood to take up a larger Space than it had before; for which Reason the Blood will be *rarified* into twice its Dimensions in the *exhausted Receiver*;
and

and it's only this way the Operation of *Cupping-Glasses* can be explain'd.

§ 14. This Alteration happens to *Vegetables*, and *fermenting Liquors*, as well as to *Animals*. How considerable Changes are made by Heat, Cold, or great Winds, in *fermenting Liquors*, is the Observation of every body conversant with them. Now all these Changes are brought about by altering either the Gravity or Spring of the *Air*.

§ 15. And it's for this Reason that some People, by their *Pains*, can foretel any considerable Change of the Season, their Blood being more rarified against wet Weather, or high Winds, will more forcibly press the sensible Membranes, whereby *Pains* will be felt they were free from before.

And this will the rather happen, because the Blood (how apparent the contrary may seem) will hereby become never a whit the more *fluxil*; for *Froth*, which is Water blown into Bubbles by *Air*, is less *fluxil* than Water it self; and the *Globules* of Blood being blown larger by the contain'd *Air* when the external Pressure is remov'd, is render'd less fluid, and will pass the small *Capillaries* with greater Difficulty.

A Fluid must have its Parts small, smooth, spherical or approaching thereto, and of equal Density, if the Fluid be *Homogeneous* by the 142 *Prop.* of *Borelli de motibus à gravitate factis*. It is not necessary that the Parts should be in Motion, as Mr. *Boyle* imagines, because 'tis neither apparent that the Parts of all Fluids are so, nor that the Parts of some Solid Bodies are not so. Therefore the Blood in this rarified Condition, is rather less, than more fluxil, and this Condition it will be in, whenever the *Air's* Weight is lessened, or its Spring weakened.

§ 16. There is no Liquor but what is something viscid, that can be blown up into Bubbles, and the more tenacious the Parts of any Fluid are, the fitter it is for this purpose; the Bubbles will be both larger, and more durable. A Mixture of Soap and Water may be blown into *Spheres* of above six Inches Diameter, and the Blood consists of Parts not unlike what is in such a Mixture. The Blood hath Watry, Saline, and Oily Parts, as is evident to the Senses: But that which puts it beyond Dispute that the Blood is blown into such little *Spherule* (and perhaps
in

in the manner Dr. Cheyne (s) has assign'd in his *Philosoph. Princip. of Natural Religion*) is what may be observ'd with a good *Microscope* in the Tail of a Fish. The *Globules* of Blood being too large to pass the smallest Arteries, change their *Spherical* Figure, for one that is *Spheroidal*, and recover their former Figure again, when they come into a wider Channel. Now it is the Property of an *Elastic* Body alone, that when its Figure is chang'd, to recover it again : and nothing being *Elastic* but *Air*, or what contains *Air* in it, it's plain, that those *Globules* must be fill'd with *Air*.

§ 17. From what hath been said, it appears, that whenever the Blood is too *Viscid*, so that the Force of *Cohesion* be not greater than that by which the contain'd *Air* endeavours to expand it self, the Person will be more sensibly affected by Change of Weather ; and from hence may be taken better *Indications*, both for the Prevention and Cure of these Distempers, than from any other *Source* whatever.

(s) Page 217, 218, &c.

They who understand this *Theory*, will know for what Reason, and in what Circumstances, moderate *Evacuations*, *Exercise*, *Steel*, and *Mercury*, are so beneficial in this Case, and will never use one of them, when another is more proper.

It would be the easiest part of my Undertaking to be particular in these Matters, but that it would encrease the Bulk of the Book to no purpose; for they, who understand not these short Hints, will be no better for a more distinct Explanation.

§ 18. I shall now enquire how the Air affects us when 'tis too *Hot*, too *Cold*, too *Moist*, or *Dry*, &c.

There is none but who observe what considerable Changes are made on the whole Face of Nature, by the Approach or Recess of the Sun's warming and enlivening Influences; the Fields, the Forests and the Gardens, put themselves in Mourning at his *Autumnal* Departure.

Animals of several kinds retire to their Dens and Caves, to spin out an unactive Life in Sleep and Rest, till by his invigorating Warmth, in his *Vernal* Return, he thaws their congealed Juices,

ces, and excites them to an active Life.

§ 19. In the Spring we see the Plants peep out of the Earth, flower and then seed, the Trees blossom and fructify, the Birds chirp and sing for Joy of the approaching Summer: Whence is all this Life and Vigour, but from the Motion and Heat the Sun communicates?

The fizy Juices are rarified, and made to mount up the slender Tubes of Plants, and expand their Fibres, whereby Vegetation is perform'd; an artificial Heat will do the same in *Green-Houses*, which shews the Affinity between this and that of the Sun.

§ 20. So that *Heat* hath a Power of rarifying and putting in Motion the Humors of our Bodies, and if moderate, of relaxing our Solid Parts, both which appear by the swelling and softness of our Skin and Veins when we are well warm'd by the Fire. On the contrary, when we are cold, our Veins are sunk, our Skin hard, rough, and contracted; but if the Heat be excessive, it will contract as much as Cold. A little Heat which only serves to drive the Moisture out of a *Fiddle-string*, relaxes it; tho'

tho' a greater Heat shrivels it on a Heap. Either *actual* or *potential* Cauteries, do the same, applied to any part of our Bodies. Now as *Heat* affects us by rarifying our Humors, and relaxing our Fibres, so it lessens the Spring of the *Air*, and therefore we don't only perspire more (according to (t) *Sanctorius's* Observation) in Summer than Winter, but sometimes more than is consistent with Health and Strength, especially if of a weak and lax Constitution. Therefore the *Cold Bath*, the Use of a *Brush*, and moderate *Exercise* in the Morning and Evening, together with *Sub-acid* and *Sub-astringent* Food, is most proper for such People.

§ 21. It is not enough to know that hot or cold *Air* is the Parent of many Distempers, such as *Fevers*, *Agues*, *Cholicks*, *Pleurisies*, *Rheumatisms*, *Catarrhs*, *Consumptions*, &c. but also after what manner it operates to their Production; otherwise we are as much in the Dark as ever, as to their Cure. And this is only done by applying the known and obvious Properties of Cold,

(t) *Medicina statica*, Sect. 2. Aphor. 41.

and Heat, to the various Alterations made in the Body, whence those Distempers are denominated.

§ 22. That the Air, when too hot, especially if Moisture be join'd with it, disposes to malignant Fevers, is the common Opinion of Physicians both Antient and Modern, and the Method how *this*, as well as a great many other curious *Phænomena* in Nature are brought about, is clearly accounted for by a late Ingenious Author (a.) But if the Heat be excessive, tho' without Moisture, it produces *Diary Fevers*, and sometimes those which the Antients call'd *Putrid*: Perspiration being too great, the Humors must remain Viscid and Dry, and so unfit for Circulation: The Fibres being relaxed also by the expence of Spirits, and the cold Evening succeeding, the perspirable Matter is then retain'd, whereby the Heat is encreas'd, together with all other *Feverish Symptoms*.

§ 23. *Agues* are *Epidemical* in the Fens of *Cambridge-shire*, and the *Hundreds* of *Essex*, both of them flat, watery Coun-

(a.) Dr. Mead's *Essay of Poisons*, p. 161.

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tries, which fill the *Air* with Vapours, whereby its *Elasticity* is weakned, the Fibres of the Body relax'd, and the Pores of the Skin obstructed.

Upon all these Accounts the Blood will be apt to deposit a slimy *Lentor* on the sides of the Capillary Arteries, and the Orifices of the Glands, as is evident from what hath been said already. But how this *Lentor* produces an *Ague*, will be too tedious to explain here; therefore I shall refer to what (w) *Bellini* hath writ on that Head; what he hath said being so full, that there is little or nothing else to be added on that Subject. Now if Coldness be added to the Moisture of the *Air*, it will so much the more certainly produce this Distemper; for Cold contracts, binds up, and makes the Blood more compact; so that its Motion becomes slower, and its Viscidity greater; wherefore a cold and moist Constitution of the *Air*, besides *Coughs*, *Distillations*, *Pleurisies*, and *Rheumatick Pains*, ushers in *Agues*, and some *Fevers* very near allied to them.

(w) De Febris, p. 320, ad 401.

Of the Air: 71

§ 24. We observe that *Hectic* and *Consumptive* People are most in danger in very hot, or cold Weather: Heat relaxeth all the Vessels of our Bodies, opens the Pores of the Skin, and encreaseth Perspiration, in which consists the essential nature of a *Hectic*, (as (x) Dr. *Cheyne* hath proved) and by weakening the Spring of the *Air*, disposes the Blood to be more Viscid and Dry, and so (by (y) *Bellini's* Theory) will encrease that Distemper.

If the Season be excessive cold, the *Air's* Weight and Spring are both encreased, and the *Tone* of the *Lungs* being much weakened in a *Consumption*, the *Air Bladders* must be expanded above what is necessary, that the Blood may circulate through the *Lungs*; and then will it, in some measure, be obstructed in its passage through them, and so produce all the *Symptoms* that are the consequents of such an Obstruction, as constant tickling to Cough, *Pleurisies*, *Inflammation* of the *Lungs*, &c. And besides this, the Cold, by closing the Pores of the Skin, will hinder Perspi-

(x) *New Theory of Fevers*, p. 129.

(y) *Bel. de Urin. & Pulsibus*, p. 320.

ration, and thereby encrease the quantity of Blood which will pass the *Lungs* yet more difficultly, and for that reason will encrease the recited Symptoms. And it is upon this account also that the Patient falls into a *Diarrhæa*, the Passage of the Serum through the *Cutaneous Glands* being stopp'd, it solicits those of the *Intestines*: But if an entrance be refus'd here, the *Legs* swell, and *Astmatick* Symptoms encrease till the Patient die.

§ 25. Besides the sensible qualities of *Heat* and *Cold*, *Moisture* and *Dryness*, it is certain, from undoubted Experiments, that the *Air* is more or less stock'd with *Vegetable*, *Mineral*, and *Animal* Substances: Rain Water contains as much *Vegetable Matter* as Spring Water does, though not so much as River Water, according to (z) Dr *Woodward's* Observations on *Vegetation*. *Colcothar* will, by being expos'd to the *Air*, turn into a *Vitriol*. The *Caput Mortuum* of Sea-Salt, will, after being expos'd to the *Air* for some time, afford a considerable quantity of such Spirits as were

(z) *Philosoph. Transact.* No. 253.

distill'd from it before; (as Mr. Seignette told (a) Lemery) what becomes of the Matter we daily perspire? Certainly 'tis elevated into the Air we breathe in, and when a dead Body corrupts, our Noses will inform us of something exhaled from it.

§ 26 And indeed it can't but be so, by the known *Laws of Nature*; for by what means soever a Body becomes divided, till some of its Particles become less than the compounding Particles of Air (in a proportion greater than that by which the density of one of these Particles exceeds the density of a Particle of Air) they will be lighter, and so be elevated into the Air, until by their *Coalition* their Gravity be so much encreased, as to sink them to the Earth again. And we need have recourse to no other Cause for the Production of this admirable effect, even in the most hard and solid Bodies, than the Rays of the Sun. Mr. Romer, from his Observations on the *Eclipses* of the *Satellites* of *Jupiter*, demonstrates, that Light is not above ten Minutes in pas-

(a) *Course of Chymistry*, p. 285.

sing from the Sun to the Earth. Now
 since the Earth is at least 10000 of its
 own Diameters distant from the Sun,
 therefore must the Light run 1000 of
 these Diameters in a Minute, which is
 above a hundred Thousand Miles in a
Second. And if a *Bullet* moving with
 the same Celerity with which it leaves
 the Muzzle of the *Cannon*, require 25
 Years to pass from the Earth to the Sun,
 as *Hugens* has computed it, then will
 the velocity of Light, to that of a *Can-*
non Ball, be as twenty five Years to
 ten Minutes, which is above a Million
 to one: So that the Particles of Light
 move above a Million of times swifter
 than a *Cannon Bullet*; and may we not
 expect proportionable Effects from them,
 tho' they are so exceeding small? For
 the *Momentum* of any Body in motion a-
 gainst another, is as a *Rectangle* under the
 Magnitude and Celerity of the moved
 Body. We may guess at the effects of the
Rays of Light separately, by what we
 observe when collected together in the
Focus of a Burning-Glass: For no *Bo-*
dy, tho' never so compact, is able to re-
 sist its Force. *Gold* it self may be *Vitri-*
fy'd by the concenter'd *Rays* of the Sun,
 though it be unalterable by any *culinary*
 Fire

Fire whatever; as Mr. *Blondel* tells us, one part exhaling, whilst the other is turned into Glass, and this in a few *Seconds* of time.

§ 27. Now from what hath been said, it appears, that the Rays of the Sun are not only able to *abrade* and file off from the most solid Bodies, such small Particles, as being separated, will become lighter than any the least compounding Particles of Air, but also by the Celerity with which they will be reflected, be enabled to carry into the Air, such little *Masses* of Matter as are really heavier than the Air they mount up in; which, when the Force impressed (constantly decreasing) becomes less than will impel them higher, they must necessarily fall down to the Earth again, and so must variously affect our Bodies, both in their Ascent and Descent, according to their various Natures and Properties.

§ 28. The *Moisture* of the Air was very troublesome and unwholesome to the first Colonies in *America*, till their prodigious Woods were in a great measure cut down, and their Land cultivated, whereby their Air became more *Serene*, and Dry. So that a woody Country

must be unhealthful for such as are of a *lax* Constitution.

The Reason of this extraordinary Moisture in *Wood-land* is easily accounted for, from (b) Dr. *Woodward's* Observations on Vegetation, which are too tedious to insert here; I shall only take Notice, ' That the Water in the Glass † that had no Plant in it, continued the ' same quantity at the end of the Experiment, as at first, tho' a considerable quantity was expended, by rising ' through the slender *Tubes* of such ' Plants as were in the other Glasses, ' and that the largest thriving Plants ' expended the most Water, and that ' in some Plants the expence of the Water to the growth of the Plant, was ' as 700 to 1; there must then prodigious quantities of Moisture exhale from the numerous Branches of large Trees, and when those Trees are also numerous, must needs make the *Air* foggy.

§ 39. The *Air* will not only be *Moist*, but partake something of the Nature of those Plants thro' which the Moisture exhales, and so may become more or

(b) *Philosoph. Transact.* No. 253.

less wholesome on that Account ; for we know by Experience, that even fragrant Smells will so affect some *Hysterical* Women, as to throw them into a *Syncope* : And there is no Constitution which some Smell or other will not disorder ; and what a strong Smell will do suddenly, a faint one may do in time. And tho' Custom may abate the Sense of it, as in *Tallow-Chandlers*, *Leather-Sellers*, and *Tanners*, yet by degrees it will operate effectually, to produce a change in the Constitution, either for the better or the worse, according to the different Subjects it hath to work on. And it is from offensive Smells, among other things, that Distempers are more frequent and dangerous in *Cities* than the *Country*, and the great Mortality that is so often in *Camps*, is commonly owing to the same Cause. The Truth of this appears by the Caution given to the *Jews* : (c) *Thou shalt have a Place also without the Camp, whither thou shalt go forth abroad, and thou shalt have a Paddle upon thy Weapon, and it shall be when thou wilt ease thyself abroad, thou shalt dig therewith, and shalt turn the*

(c) *Deuteronomy*, c. 23. v. 12, 13.

back, and cover that which cometh from thee. It wou'd have been impossible for so numerous a *Host* to have subsisted so long, without all that Care we read of in the History of their Passage from *Egypt* to the *Holy Land*.

§ 30. The Distempers that rage most in *Camps*, are *Dysenteries*, and *Malignant Fevers*; and though the Passions of the Mind, and bad Diet, have a great share in producing them, as I may observe under their proper Heads, yet nothing contributes more to the production of such Distempers than the *infected Air* they breathe in, occasion'd by that filth which is the necessary attendant of such a Place, especially in *Sieges*, where the corrupted Particles of dead Bodies, both of Men and Beasts, fill the Air with an intolerable Stench; besides, the *Steams* that are raised into the *Air*, from the Bodies of Men and other Animals, by Perspiration, must so load the *Air*, as mightily to encrease its Gravity; and the Heat of the *Camp* will also weaken its *Spring*; upon both which Accounts it will be unfit for Respiration, and thereby the Blood be *unbroken* in the *Lungs*, and so dispose to those Distempers that proceed from a viscid Blood: Such are
Agues,

Agues, Malignant Fevers, and Dysenteries, as is evident from the *Theory* of these Distempers.

§ 31. The *Air* upon the *Sea* being too salt and moist, causes *Diseases* in *Seamen* that we on the Land know little more of than the Name: Their Diet, which is principally salt Meat, together with the Cold they are expos'd to, contribute their share; but the *Air* which they constantly breathe in, and which mixes it self with whatever they eat or drink, and which is always contiguous to their Bodies, must needs be a Principal in all their Disorders.

They are generally very *Costive*, and (e) *Ramazin* observes from *Bartholin*, that they require almost double the Dose of Physick to purge them that other People do.

The Salt in the *Air*, and also in their Meat, shrivels up the Fibres of their *Guts*, and make them almost insensible; and being the expulsion of the *Feces* is owing to the *Peristaltick Motion* of the *Guts*, whatever abates that, as salt Things will do, it will make the Man *Costive*,

(e) De Morbis Artificum, &c. p. 224.

and will also lessen the Force of a purging Medicine. But the *Scurvy* is that Distemper they dread the most, and which few of them escape; and tho' there are so many odd Symptoms, as *red, blue, or black Spots* on the Legs, *extraordinary Weakness*, a *redness* and *itching*, *rotten Gums*, *stinking Breath*, *loose Teeth*, *unequal Pulse*, *violent Pains*, &c. yet they are all accountable for, from that alteration of the Blood which will be brought about by a *salt* and *moist Air*. From what I've said above, it will render the Blood more Viscid than in a natural State, and the *Salt* in the *Air*, and especially the *Bittern* in that *Salt* which they eat, will heat and rarify this Viscid Blood, and so encrease its Celerity, and the *Globules* being greater, will stay in the Capillaries till the Force of the circulating Blood either break them, or remove the Obstruction; from whence arises the *Spots* and *Itching* in the Skin, for *extravasated* Blood turns *livid*, or *black*, some of the *extravasated* Blood *putrifies*, so that the *Gums* rot, and the *Breath* stinks, *Pains*, irregular Pulse, and the other Symptoms derive their Original from the same Source. That *Salt* is a principal Actor
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in this *Trajedy*, is confirm'd by the Observation of (e) the aforementioned Author, on those who work in making Salt. They are almost all *Cachectick*, *Hydropical*, with sordid Ulcers and Scabs upon their Legs, have voracious Appetites, are great Drinkers, and oft die suddenly.

§ 32. I might here take notice of the Influences of the *Planets*, since they act only by altering the *Air*, as to its Gravity or Spring, or by raising *Effluvia* from the Earth, and by their Heat, which is always proportional to their Light, being both as the Squares of their Distances reciprocally, and as the Signs of the Angles of their Incidence. Those who think the *Planets* have no Influence at all, need but to read Dr. Mead's Book *de Imperio Solis & Luna*, &c. to be convinc'd of their Error; for he has from Sir *Isaac Newton's* Principles, demonstrated the necessity of their Influence upon Human Bodies, so that what heretofore was only Conjecture, is now demonstrated Truth.

(e) Page 226.

§ 33. We may guess at the Effects of *Mineral* Particles raised into the *Air*, either by the Heat of the Sun, or a *Subterraneous* Fire, by the Alterations that are made in the Bodies of those who are most conversant with them. *Miners* in general are subject to *Asthmas*, *Consumptions*, *Apoplexies*, *Palsies*, *Cachexies*, *swell'd Legs*, *falling out of their Teeth*, *Ulcers of the Gums*, *Pains in the Joints*, and *Tremblings*: In particular, *Lead* gives *Cholicks* and *Palsies*.

Copperas, by its Stipticity, being constantly applied to the *Aspera Arteria* in Respiration, so contracts and straitens the Vessels, that the *Air* is not able to expand the *Lungs* to such a degree, that the Blood may circulate freely, for which reason they who work upon it, are, according to common Observation, *Asthmatick*.

§ 34. But of all others, the *Mercury Miners* are liable to the greatest Inconveniencies. * *Fallopins* tells us, that in four Months time they begin to tremble, and scarce any of them live three Years. They are subject to *Palsies*, *Vertigo's* and

* *Tract. de Metal. & Fossilibus.*

Hectics, as appears from the Authority of a great number of Writers cited by *Ramazini* (t).

In order to account for those different effects of *Mercury* upon Human Bodies, I shall premise that it is capable of entering through the Pores of the Skin into the Mass of Blood, as appears by those who are *Salivated* by *Mercurial Unctions*; as also that *Miners* can change the Colour of Gold from yellow to an obscure white, by holding it, for some time, in their Mouths: Now *Mercury* being enter'd into the Mass of Blood, of such as work daily upon it, must wonderfully dissolve and rarifie it; for it being about ten times as heavy as the Blood, every Particle of it will have ten times the Force to dissolve the Blood, that a Particle of Blood of the same Magnitude will have: For the *Momentum* of either a Particle of *Mercury* or Blood, to break thro' any Obstacle, or overcome any Resistance, is as a *Rectangle* under the Celerity with which it is moved, and the quantity of Matter contain'd in it, which is measur'd by its Weight.

(t) De Morbis, Art. 6. 1, 2, 3, 4.

Now the Celerity being the same in both, the *Momentum* must be as their Gravities; and the Gravity of *Mercury* to that of Blood, being as ten to one, the *Momentum* of *Mercury* must be ten times as great as that of Blood. But if we consider how much more swiftly the Blood moves in those who have taken *Mercury* (the Pulse being both quicker and stronger) as also the Hardness and Exility of the Parts of *Mercury*, by which they act as so many little Wedges in dissolving the Blood, and removing Obstructions, we shall easily believe what Dr. Cheyne tells us (g), That the Blood, assisted by any considerable quantity of *Mercury*, will be able to do as much, in the removal of Obstructions, in one Day, as the Blood unassisted in three Years.

The Blood being in this rarified Condition, will stretch the sides of the Arteries beyond their usual Limits, and so the Carotid Arteries will press upon the Optick Nerves, and at every Pulsation of the Arteries, will shake the Optick Nerves, and the several Branches of

(g) *New Theory of Fevers*, p. 122.

'em dispers'd thro' the *Retina*, a little out of their Places; so that the same Object, tho' at rest, will every Moment paint its Image upon different Parts of the *Retina*, and therefore seem to move upwards or downwards, to the right or left, or circularly, according to the various posture the *Retina* is put into; for 'tis the same thing to us, whether the Object move and the Eye be still, or the Eye move and the Object be at rest: We shall in both cases have the same Sensation, but in the latter we are said to be *Vertiginous*; so that 'tis no wonder that *Mercury-Miners* are subject to this Distemper.

This extension of the Arteries may be such, from a greater Rarefaction of the Blood, as so to press and straiten the contiguous Nerves, that the Passage of the Spirits thro' 'em to the Muscles, will be either wholly obstructed, or in part; so that there will be either a *Trembling Motion*, or none at all.

Besides this, a *Palsie* is sometimes caused by the hardness and driness of the Nerves, whereby their Cavity is lessen'd, and the Motion of the Spirits obstructed, and upon this account both Sense and Motion are taken away. From what

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hath

hath been said, it appears that *Mercury* hath a wonderful efficacy in removing Obstructions, making the Blood Fluxil, and scow'ring the Glands, whereby all Evacuations will be encreas'd, and the Body depriv'd of its most Fluid Parts, (b) (for in all Secretions the most Fluid Parts are first separated) so that the Solid will become more dry than in a state of Health, which was to be prov'd.

There is yet another Reason why *Mercury* may, when receiv'd into the Body in too great a quantity, produce a *Palsie*: For if in any Artery there be so much *Mercury* amass'd together, that its weight be able to resist the Force of the circulating Blood, so that the *Muscle* in which that Artery terminates, having its due Supply of Blood cut off, will lose its Motion. Any one may be satisfied of the Truth of this, by making a Ligature upon the descending Trunk of the great Artery of a Dog, for he will find him incapable of moving his hinder Parts. The same thing may happen in the Nerves, whereby

(b) By the 3d Proposition of Animal Secretion.

the Spirits are obstructed, so that we see, upon several Accounts; that *Mercury* may produce a *Palsie*.

But how it shou'd cause a *Hætic*, will not be so easily accounted for by those who subscribe to the common Theory. For *Mercury* is fitter to cure, than to cause, a *Hætic*, if owing to the causes generally assign'd. (i) *Etmuller* tells us, ' That the immediate Cause of a *Hætic* ' is the Indisposition and unequal Texture of the Blood, caus'd by the salish sharpness of the Lympha in the Conglobate Glandules, and the Viscosity of that in the Conglomerate, ' from whence ensue a deprav'd and ' diminish'd Fermentation, Weakness, ' weariness and deficiency of Spirits, ' and the whole Train of *Hætic* Symptoms; the Saline and Viscid Blood is ' render'd unfit for nourishing the Parts, ' and after Eating, when the thin parts of ' the Chyle dilutes the Blood, and disengages the Salts, the Pulse is a little enlarg'd, and the Heat augmented, and ' after some time, sink again to the ordinary pitch; and the course Remains

(i) Oper. Medica. cap. De Febre Hætica.

‘ of the Chyle are frequently voided
‘ by Night-Sweats, as having receiv’d
‘ a vitious Tincture from the Saliva in
‘ the Stomach. What the Author
means by an unequal Texture of Blood,
will never be understood by those who
know that the Texture of the Blood is
never equal, even in a state of perfect
Health, that is, its parts are never similar
and of equal density; but could we
conceive this unequal Texture of the
Blood, and that which is still as difficult
to understand, how the saltish Sharpness
of the *Lympha* in the *Conglobate Glandules*,
and the Viscosity of that in the
Conglomerate, can be the cause of it, yet
we know nothing fitter to blunt the
edges of sharp Salts, and remove the
Viscosity of any Fluid in the Body, than
Mercury; and therefore instead of causing,
shou’d cure a *Hectic*. So that we
must either quit the common Theory, or
deny that *Mercury* can cause a *Hectic*; but
since the Fact is certain, let’s try how we
can account for it. From what hath been
said before, it appears that *Mercury* will
wonderfully enlarge the Orifices of all the
Glands of the Body, and by spending the
Spirits in excessive Perspiration, will
make an universal relaxation of all the
Fibres

Fibres in the Body, and the Diameter of Vessels will be hereby enlarg'd, and the quantity of Blood mightily diminish'd, and the Strength greatly impair'd; for the Strength of an *Animal* is in triplicate Proportion to the quantity of his Blood, &c. if the Reader understand but Dr. *Cheyne's Theory of a Hætic*, he can't but clearly see how *Mercury* may be the cause of it.

§ 35. By those few Instances we see what vast Alterations may be made in the Constitution of an Animal, by the Operation of *Mineral* Particles, when by any means admitted into the Mass of Blood, as they will be more or less, in proportion to the number of them floating in the *Air*: So that a Physician can't better spend his Time for the profit of his Patient, than study the Constitution of the *Air* in which he breaths, it being the Parent of so many Distempers. In *London* People are *Costive*, *Asthmatic*, *Hysteric*, and *Hypochondriac*, as also subject to Fevers of several kinds: The like I have observ'd at *Sheffield*, a great Manufactory for Knives and all other sorts of Iron Ware; which occasions the burning a prodigious number

of Coals, which, by their Sulphureous Vapours, will necessarily dispose to those Diseases.

And were we to consider the various Constitutions of the *Air* in the several Seasons of the Year, in imitation of the great *Hippocrates*, or that nice Observer, our own Country-Man, Dr. *Sydenham*, we shou'd be able to foretel future Distempers with such exactness, as would raise the Admiration of all that heard us, and might give Occasion to make use of such things as are proper to prevent 'em, and so far assist us in discovering their Nature, as mightily to facilitate their Cure.

(k) *Hippocrates* tells us, That the change of the Seasons is the principal Parent of Diseases, and no wonder that it should be so, seeing the different Spring, Weight, Heat, Cold, Moisture, &c. of the *Air*, are able to make so great Alterations in a Human Body, as I have fully proved they are. I had thought here to have *Commented* upon several of *Hippocrates Aphorisms*

(k) *Aphor.* I. § 1.

in § 3. about the *Air*: But considering the vast difference of the Climate, where he lived, from ours, I concluded that many of his Observations would be useless to us, as I found, by examining, they were; therefore I rather chuse to give an Account of the various Constitutions of the *Air* in *London*, taken notice of by that sagacious and indefatigable Searcher into Natural *Phænomena*, Dr. *Thomas Sydenham*, for 14 Years together, viz. from the Year 1661, to the Year 1675.

An Abstract of Dr. Sydenham's History of Epidemick Constitutions of the Air.

§ 1. **H**E tells us, That from the Year 1661, to the Year 65, the *Depuratory* and *Intermitting* Fevers of all kinds were *Epidemical*.

§ 2. In the *Depuratory* Fever, besides the common Symptoms of other Fevers, he observ'd that the sick Person is very faint, vomits, or enclines thereto; the Tongue is black and dry, there is a sudden prostration of Strength, the external Parts are dry, the Urine is thick or

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thin,

thin, each a sign of Crudity; in the declension a *Diarrhæa* happens (unless it be prevented in the beginning) which protracts the Disease, but of its own Nature, it terminates in 14 or 21 Days, with a gentle Sweat. Other Symptoms happen upon irregular Practice.

§ 3. He begins the Cure with *Phlebotomy* in *Plethorick* Constitutions, which he repeats or omits, and gives Cordials more liberally or sparingly, and loosens or binds the Belly, as the greater or less commotion of the Blood indicates; after *Venaesection* (if it be necessary) if the Patient vomit, or have a *Nausea* at his Stomach, he prescribes a Vomit, and an Opiat at Night after it, by which means a *Diarrhæa* is prevented; so certain is this, that if a *Diarrhæa* happen in the declension, you may be sure there was either a *Nausea* or Vomiting in the beginning, and no Vomit given: He adventures to vomit them in any *stadium* of the Distemper, if a present *Diarrhæa* and *Nausea* indicate it.

In the *Autumn*, *Bleeding* and *Coolers* are not so safe, but a Vomit is necessary, after a laudable Sediment in the Urine, shews the Fever to have left the Patient, which commonly happens on the

the fourteenth Day, if Nature be not disturb'd by too cooling a Method; in which Case it falls out about the twenty first Day; a Purge is to be administered: Till then he is to lie in Bed. Sometimes, especially in Old Men, a Cough, with spitting much tough Matter, succeeds a Fever, which is cured by moderate drinking of generous Wines. *Opiats* ought not to be given till the end of the Fever, and after Purging, if possible.

§ 4. Here we have a most accurate History of this Fever, with all its distinguishing Characteristicks, and a method of Cure, establish'd upon a long Series of Experiments; and how rational it is, will, in part, appear, by what I have already said of Fevers, and be farther illustrated by what I am about to say. Faintness, prostration of Strength, driness of the Tongue and Skin, are accounted for before: I shall now shew, that when the Blood is in too great an agitation, (which is all our Author means by Crudity,) the *Urine* will be clear and thin, or thick and muddy. Perspirations will be stop'd, the Skin being dry, and the saline Parts of the Blood which used to be evacuated that way,

way, will be retain'd among the *Serum*, which, together with the greater Heat, will stimulate the *Kidnies*, whereby they will be so contracted, as to let out nothing but the most thin part of the *Serum*. And so violent may the Motion of the Blood be, as to break some of the solid Parts into such small Particles as will, with the *Serum*, pass the *Kidnies*, (especially if by any means their Fibres be in the least weakned and relax'd) and after they are separated from the Body, so obstruct the Rays of Light from passing directly through the *Urine*, as will make it appear thick and turbid; and besides this, the *Urine* will be less Fluxil upon the account of this mixture, for the Viscidity of Liquors is owing to the quantity and figure of the Solids which swim in them, and the different degrees of *Attraction* those Solids have among themselves.

§ 5. The reason why a *Diarrhœa* happens in the declension, when no Vomit hath been given in the beginning, and why a Vomit prevents it, is, because a *stimulating* Matter lying in the Stomach for some time, as it causes *Nausea's* and Vomiting whilst it remains there; so after it is protruded into the *Guts*, as it
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sometimes will be, will act its part there, and cause a Purging: But on the contrary, this Matter being evacuated by a timely Vomit, and the Stomach regaining its Tone again, is better enabled to preform its Office, whereby the generating of such Matter is prevented. There are several other advantages accrue to the Patient by this means, as you may see in (1) Dr. Cheyne's *New Theory of Fevers*, yet I have frequently observ'd the Patient much worse upon taking a Vomit; for Vomiting is not always to be cured by a Vomit, but sometimes by such things as moisten, soften and relax the too tense and irritated Fibres of the Stomach: Besides there are some of so delicate Constitutions, as are not able to bear such violent Commotions without the greatest hazard: Which therefore put me upon contriving another Method less obnoxious to those Inconveniences, and that at last I hit upon; for by a proper management of gentle cooling Purgatives, of which there are some very agreeable to the Stomach of such as are in a Fever, all is done that is

(1) Page 72.

expected from a Vomit (except the effects of a violent Contraction of the Muscles of the *Abdomen* and *Diaphragma*) both with more ease and safety. Vomiting is more necessary in the *Autumn* than the *Spring*, according to our Author's Observation; for in that Season of the Year the Humors of our Bodies are more Viscid, and the Vessels in which they circulate more lax and yielding, upon both which accounts Vomiting is more proper. And it is upon this account that *Bleeding*, and too cool a *Regimen*, is so dangerous in this Season.

Tho' I have been very short in my Reasonings upon this Fever, yet I have exceeded my own Design, therefore resolve to be more brief upon the other.

§ 6. The *Intermitting Fevers* of this Constitution he reduces to *Vernal* and *Autumnal*; the *Vernal* generally begin in *February*, the *Autumnal* in *August*; the *Vernal* are *Quotidian* or *Tertian*, and are short and wholesome, except they be protracted by unnecessary *Bleeding* or *Purging*.

The *Autumnal* are *Tertian* or *Quartan*, the first not so dangerous, often leaves them

them about the Winter *Solstice*, the other is more dangerous, which often produces the Scurvy, Inflammation of the Tonfils, hard Bellies, and the Dropsie; the Young sometimes get quit of it in *December*, but oftentimes not till *March*, and if Bleeding and Purging have weakned 'em, then not till next *Autumn*: It's more dangerous to the Aged.

Those who have had a *Quartan*, if they have it a second time, it lasts not over two or three Paroxisms.

The *Vernal* are to be left to Nature, for they never kill. He found Vomiting good before the Paroxisms, and Sweating after them.

The *Autumnal* are more difficultly cured. If the Constitution be *Epidemical*, the Adult are seiz'd in *June*, if not in *August*, and the beginning of *September* they rather remit than intermit, for the first Days.

§ 7. The Author thinks there is a great affinity between these Fevers and the *Depuratory*; for he observes, that ordinarily the *Depuration* of the Blood is perform'd in 336 Hours, and if we reckon five Hours and a half for a Paroxism, in intermitting Fevers, then so
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many Fits as at five Hours and a half a piece, amounts to 336 Hours, will terminate the Distemper, if left to Nature, which is agreeable to Observation: And for this reason 'tis, that *Tertians* continue longer than *Quotidians*, and *Quartans* than these, being longest in running the circuit of three hundred thirty six Hours.

§ 8. I shall take no further notice of his Method of Cure, being every Body knows that the *Cortex*, rightly administred, is a *Specifick* in all kinds of intermitting Distempers; I say if rightly administred, because I have known it often unsuccessful when given by an unskilful Hand. In particular, a Tradesman in *Sheffield* who was worn almost to a *Skeleton* by a Quartan Ague, he got in *Effex*, which he had labour'd under for a Year, when I was consulted: Besides a great many other Medicines, he had taken above half a Pound of the *Cortex* without any advantage; and finding his Stomach quite gone, and he constantly faint and chil; after I had vomited him with *Vinum Benedictum*, I cured him by giving him only two Ounces of *Cortex*, with a good quantity of *Rad. Sepentar. Virginian.* added to it,

it, by which, both its heating Cordial, and dissolving Properties, were encreased.

§ 9. The next Constitution begun in 65, for after a very cold Winter, and dry Frost in the Spring, till the end of *March*, which then ended with a sudden Thaw, in the Year 65, Multitudes died of *Pleurisies*, *Quinsies*, *Inflammations* of the *Lungs*, and such like Distempers; from which time a continual *Epidemical* Fever begun, worse than the *Depuratory*, the Head-ach and Vomiting were more grievous, the *Diarrhæa* was encreas'd, not lessened by a Vomit, and the Vomiting made worse, the external Parts were dry, yet, after Bleeding, Sweat might easily be forc'd at any time of the Distemper, with some advantage, which could neither easily be done in the *Depuratory*, nor if it could, was it without danger, till the 14th Day. The Blood in this Fever is somewhat *Pleuritick* or Syzy.

§ 10. The Blood being made very susceptible of Motion, and Spirituous, by the preceeding Frosty Dry Weather, and the Fibres of the Body being relaxed, and the Pores obstructed by the sudden Thaw, do certainly dispose to the Distempers

stemper above recited: The Truth of this is deducible from what I have said in several parts of this Book, so shall not trouble the Reader with my Reasons here. Vomiting is improper in this Fever, for the same cause I have rejected it in the *Depuratory*, the Inflammation being greater, and the motion of the Blood swifter, the Tensity of the Fibres are such, as not to bear the least irritation, for which reason, Bleeding, and gentle Sudorificks, must be useful: But 'tis best for the same reason to force Sweat by Liquors actually hot, together with the weight of Bed-Cloaths, rather than by the *Alexipharmics* commonly prescrib'd.

§ 11. After this began the *Pest*, which encreased till the *Autumnal Equinox* in the Year 66, when it destroyed about 8000 in a Week, from thence it abated till the Winter-Cold almost vanquish'd it: In the Spring it quite ceased. The former Fever remain'd (tho' not so Epidemical) till the beginning of the Year 67.

§ 12. At which time the 3d Constitution begun with the *Small Pox*, which encreased till *Autumn*, and then were *Epidemical*, and from thence decreas'd till the

the next Spring, (*viz.*) 68, when they begun to rage violently, and continued till frosty Weather next Winter, which abated them; then in the Spring 69 they appear'd again, tho' not so universally as before, and lessen'd till August 69, when they gave place to an *Epidemical Dysentery*.

§ 13. A Fever which the Doctor calls *Febrio Variolosa* begun when the Small Pox begun, in 67, and ended with them in 69, it had all the Symptoms of the Small Pox, save those that attend the Eruption, Maturation, &c. of the *Pustules*. The Signs are a Pain on the Heart-pit, especially if pressed; Pain in the Head, and Heat of the whole Body, with Purple Spots, not very Thirsty, the Tongue and Urine natural in the beginning, except that the Tongue be sometimes white, seldom dry, and never black, a *Phrensie*, and encrease of the Spots from a hot *Regimen*. There are Symptomatic Sweats in the beginning, irregular Practice protracts the Fever to five or six Weeks, if Death prevent not. Critical *Salivation* towards the end, terminates the Distemper, if cooling Medicines have been
 I given,

given, and neither violent Sweats, nor Purging prevented it.

§ 14. Where the Strength will bear it, he begins with Bleeding, which he repeats every other Day, and gives a Glister on those Days he does not order Bleeding, and cooling Julaps, with Whey, or Barly Water, *ad libitum*: The Patient must rise out of Bed every Day, notwithstanding he sweats: A *Symptomatic Diarrhœa* is best cured by *Venæsection* and Coolers. After the *Salivation* is begun, no Evacuation is proper.

§ 15. A *Diarrhœa* suppos'd to be the Variolous Fever turned upon the Guts, and of great affinity to it, raged all Summer in the Year 69: It was made worse by *Purging* and *Astringents*, but cured by the same Method with the Fever, (*viz.*) by Bleeding, and Coolers. I shall only observe here, that most Distempers have some affinity with the general ones of every Constitution; which gives an useful hint to direct us in their Cure, with greater certainty, and better success, than otherwise we could expect.

§ 16. This *Diarrhœa*, which begun the 4th Constitution, was succeeded by the foremention'd *Dysentery*, and in the
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beginning of *August* 69, the *Cholera Morbus* was more *Epidemical* than ever he (our Author) saw it, which yet lasted but till the beginning of *September*; no more than it does other Years, when it is *Epidemical*, tho' from evident Causes, it happens at any time of the Year.

§ 17. About the end of *Autumn*, *Tormina* without Purging, or the Dry Gripes begun, but ended in Winter; yet the *Dysentery* that begun with it, continued very *Epidemical*, but in very cold Weather ceased.

§ 18. The *Anomalous Small Pox* begun in *January* 1642, as the *Dysenteric* Fever did the *August* before, which continued all the *Dysenteric* Constitution, which ended in 72.

§ 19. The *Anomalous Small Pox* begun in *January* 69, and continu'd to the end of the *Dysenteric* Constitution in 72: They gave place to the *Dysentery* always in *Autumn*, and the *Dysentery* to them in *January*, till the last *Autumn*, in which they both raged: Besides the common Symptoms with the other, they differ'd as follows.

In the *Discreet* when they are very distinct, they appear the 3d Day; in the re-

gular not till the 4th, they are less and rougher in these, in the progress of the Distemper, than in the other; they are oftner black after they are ripen'd than the other; sometimes (tho' seldom if the Pustules be very few) they Salivate.

In the *Confluent*, they differ in this, sometimes they shew themselves the second, and sometimes the third Day, like a reddish uniform Tumor, which covers the whole Face harder than an *Erysipelas* without any visible distance of the Pustules, the rest of the Body was cover'd with numberless Pustules join'd together, of a red Colour, and sometimes, tho' but seldom, is there this mortal Symptom, viz. little Bladders between the Pustules of the Thigh fill'd with a limpid *Serum*, which being broke, runs out, and the Flesh under them is as black as if *Sphacilous*. About the 11th Day a whitish *Pellicle* appears upon divers parts of the Face, on that reddish Tumor before describ'd: This *Pellicle* in a little time crustates a crusty splendid Matter, of a deep red Colour, like concreat Blood, which ripening, grows blacker, till the Face be as black as a Coal: The fourteenth, and sometimes the

the seventeenth, is the *critical* Day in these, if over-hot *Regimen* kill not the Patient sooner.

In these all the Symptoms are more grievous, the Inflammation is greater, the Pustules less and more angry, scarce distinguishable from an *Erysipelas*, or the *Measles*, but by the times of their Eruption. When the Pustules fall off, the surfuracious Matter stays longer, and the Scars are worse.

§ 20. His Cure, besides *Hypnotics*, when either Sickness, Watching, or *Delirium*, indicate (which must only be given to the Adult, in the distinct) a more cooling method must be used in proportion to the Inflammation, which when greater, drink plentifully of the *white Decoction* made very thin, or Milk and Water, both which promote the Salivation, and tho' the *Menses* should flow, yet let the Patient drink plentifully.

§ 21. The *Dysenteric* Fever begun in *Autumn* 69, and continu'd during the *Dysenteric* Constitution. This Fever seiz'd those who had no *Dysentery*, only sometimes they had slight Pains, either with or without Stools. It had all the *Dysenteric* Symptoms except Purgings,

and its consequents; in the first Year of this Constitution, there were some gentle Pains, but after that scarce any: They sweat very little or none at all, but the Pain of the Head is greater in this than in the *Variolouse*; tho' the Tongue, as in the *Variolouse*, be moist, and white, yet hath it also a white *Pellicle* over it: It seldom terminates by Salivation, as the other doth. In the declension, the Patient is more troubled wit^h *Apthæ*, than in any other Fever, especially after a hot *Regimen*; if Sweat be forc'd in the beginning, it causeth a *Coma*.

§ 22. The Cure is, by Bleeding and Purging every other Day, for several times without Opiats after them: Use a slender Diet. After the second Purging the Patient may eat Chickens, and three Days after the last Purge, if the Patient be very weak, as *Hysterical* Women generally are, a gentle Opiat mightily recruits, but does hurt before.

§ 23. The regular *Measles* begun in *January* 167 $\frac{1}{2}$, encreas'd till *March* the Tenth, then decreas'd till *July*, when they quite disappeared. The *Small Pox* abated in *August* 71, and the *Dysentery* returned more violently than before, but in the

the Winter gave place to the *Dysenteric* Fever, and Small Pox again, which raged all Winter. (*February* is the common *Epocha* of Vernal Fevers, as *July* is of the *Autumnal*) In the beginning of *February* a *Tertian* took place, tho' not very *Epidemical*, the other Fevers abated, and the *Tertian* vanish'd about the Summer Solstice, as the Vernal *Tertians* commonly do. In *July* 72, the *Dysenteric* Fever begun again, tho' milder in the latter end of *Autumn*, when the *Dysentery* return'd, which gave place again in Winter to the *Dysenteric* Fever, and the Small Pox; when I say one gave place to another, I only mean they were not so *Epidemical*, for each Distemper generally invades some, throughout the whole Constitution.

§ 24. Through this Constitution the *Dysenteric* Fever begun in *July*, the *Dysentery* was *Autumnal*, the Small Pox begun in *January*, the *Dysenteric* Fever abated, and the Small Pox continued till *July*, when the *Dysenteric* Fever begun again.

§ 25. The fifth Constitution takes Place from the beginning of *July*, 73. In the beginning of this Constitution the Fever gave greater signs of a more Spi-

rituous Inflammation, (as most *Epidemical* Distempers do) than it did afterwards; for at its beginning, as also the Spring after, there were signs of a *Pleurisie*, the Blood was *Pleuritick* the first or second time the Vein was open'd.

Besides the Symptoms common to all Fevers, there are these especially in this, *viz.* violent Pains in the Head and Back, a *Stapor* and Pain in the Joints, a tensive Pain in the Limbs, and even the whole Body, but less than in a Rheumatism; for the first Days, Cold and Heat succeed each other: Sometimes in the beginning of the Distemper they sweat a little, when the Fever is left to it self, the Tongue is moist and whitish, and scarce any Thirst, the Urine almost natural, but if the Patient be heated too much, the Tongue is dry, and of a Colour between brown and yellow, a great Thirst, and the Urine very red; if it be rightly treated it ends in 14 Days, if otherwise, then not till the 21st. Sometimes the Patient hath a *Coma*, which lasts two or three Weeks, and then he recovers not till the 28th or 30th Day. The first sign of it is the desire of some absurd or unaccustomed Meat, which may be granted him in a little quantity.

Some-

Sometimes the Head nods, this and that way, by reason of Weakness; faint Sweats which succeed the Fever, may be cured by generous Wine. A Dysentery and Diarrhœa in Autumn, 75, succeeded, which was nothing else but this Fever thrown upon the Guts.

§ 26. The first thing in the Cure is to let Blood, then apply a *Vesicatory*, and after that give a Clyster every Day, and use a cold *Regimen*: After the 14th Day leave 'em to Nature, give Small Beer *ad libitum*, and if there be a *Phrenzie*, drop Spirit of *Vitriol* into it.

§ 27. This Fever was not very *Epidemical* till July, in the Year 75, neither were the forementioned Fever, nor the Small Pox, that begun in 70, quite excluded in 73, tho' the Symptoms of the latter were much milder, there were yet, viz. in 73, a few in the Dysentery, the Small Pox kept pace with the Fever, I last describ'd, all Winter, but neither very *Epidemical*. In *Christmas*, being very warm after a hard Frost, there were some Dysenteries which then quite ceas'd.

§ 28. In *January*, 1674, the *Anomalous Measles* begun and increas'd till *March*, and ceased in *June*. They were very
Epi-

Epidemical, the *Febris Morbillofa* bore the same Date, and had the same Period. At the same time begun the *Black Small Pox*, which raged more or less, till about June 75.

The *Anomalous Measles*, as they were very *Epidemical*, so were they Mortal, if wrong treated; the Eruption happened sometimes sooner, and sometimes later than the fourth; the Pustules in these first occupied the Shoulders and Trunk; in the other, viz. the Regular, the Face; the branny Scales which defile the *Cuticle* in the end of the Distemper, in the other, rarely happen in these, the Fever and *Dyspnœa*, in the end of the Disease, are more vehement, and liker to a *Peripneumonia* in these, than in the other.

§ 29. The Cure. Put them to Bed two Days before the Eruption, with their usual covering, give them Oat or Barly Grewel, roasted Apples, small Beer, Milk and Water, and a Pectoral Ptisan.

§ 30. The *Febris Morbillofa* differ'd from the Measles, in that the Pustules which imitated the Measles, were few, and broke out on the back of the Neck and Shoulders, and some on the Trunk; the

Of the Air. III

the Fever is of the same kind with the Measles, but more vehement, and sometimes continued 14 Days or more. Bleeding and Glifters do harm, it is cured like the Measles of the same Constitution.

§ 31. The Black Small Pox, which begun *January*, 167 $\frac{1}{4}$. The Confluent were of a fuscous Colour whilst unripe, but black when ripe; they differ but in few things; from the *Anomalous* in 69 they are more Putrid, and smell worse: When ripe their Matter is more gross, and more difficultly digested. This is worth remarking, that by how much the milder the Small Pox are, by so much sooner the Pustules ripen; for in the regular Confluent, the Patient was past danger the 12th Day; in the Anomalous Confluent in 70 they were past danger the 15th or 17th Day; but in these they often die after the 20th Day, and sometimes if they recover (which rarely happens) the Legs not only swell, (as they commonly do in all the Confluent kind) but the Arms, Shoulders, Thighs, and other Parts, with intolerable *Rheumatic* Pains, which sometimes end in *Impostumations* of the Musculous Parts, by which the Life is in danger
after

after the Pox hath left them. These Pox are almost as fatal as the Pest.

§ 32. The Cure. A hot *Regimen* encreaseth the Fever, and causeth a *Pleurisie* and Purple Spots: Too cold a *Regimen* hinders the Swelling of the Face and Hands, and prevents the plumping of the Pustules, which are all necessary. Most dy'd that us'd the method formerly prescrib'd, but not with the following, *viz.* after the 5th or 6th Day, the Patient must drink plentifully of small Beer, with *Spirits* of *Vitriol* in it, to the end of the Distemper, especially at the maturation of the Pustules when the Fever is highest. The Adult must have *Laudanum* every Night after the Eruption; a Glass of Sack may be given towards the end of the Distemper, if the faintness of the Patient require it.

§ 33. After a very warm Season, which continu'd to the end of *October*, 75, sudden cold and moist Weather succeeded, which occasion'd the most *Epidemical Cough* that ever our Author observ'd, which ended in a Fever, like that in 73, and counterfeited a *Pleurisie*, and *Peripneumonia*; there was Pain in the Head, Back and Limbs, it abides not the

the Bleeding that a true *Pleurisie* doth.

§ 34. The Cure. When there is nothing but a Cough, a cooling Diet without Flesh Meat, and Strong Drink, is sufficient. If the Fever be begun, Bleed, apply a Blistering Plaister to the Neck: Give every Day a Glister: Keep not too close in Bed: Bleed again the third Day, if the Pain abate not, and continue Glisters, but not to *Hysteric* and *Hypochondrical* Persons, and if extraordinary Heat requires it, Bleed again.

§ 35. I had not been at so much Pains to contract and methodize the Doctor's History of these Distempers, but that it is the most exact of any extant, and done by one on whose Integrity we may depend, and to render it more useful by the succeeding Corollaries. It is not enough to read such a History, tho' never so True and Critical, the Memory being not able to retain the Tenth Part of it, even tho' it were contracted; but we must carefully consider each part separately, and so compare one part of the History with another, as to draw general Conclusions from them, which being but few in Number, are easily remembered, and so will become useful in Practice.

Etice. And if every one that is capable wou'd contribute his share to so beneficial an Undertaking, we might in a little time be furnish'd with *Maxims* to direct us in a more successful Practice, than what is known at present.

Corollaries from the preceeding History.

I.

Different Constitutions of the *Air* the cause of different Distempers, and those Distempers are generally stated and regular, as appears from the History in general.

II.

The Distempers of each Constitution having an affinity to each other, tho' they differ in several respects, yet require something common in their Cure, as proceeding from a common Cause: So that he who is able to cure one *Epidemical* Distemper in any Constitution, hath an advantage in the Cure of all the other. By § 7, 13, 15, 18, 21, and 30.

III.

III.

Intermitting Fevers, and such continued ones as are allied to 'em, are protracted by a cold *Regimen*. By § 3. and § 6. compared with § 7.

IV.

To know how *Specifics* operate in the Cure of Distempers, is not only useful to the right administering of 'em, but also shews us how to improve their Virtues. By § 8.

V.

Cold, Frosty Weather, often puts an end to *Epidemical* Distempers, such as the *Plague*, *Small Pox* and *Dysentery*. By § 11, 12, 17.

VI.

A hot *Regimen* pernicious in the *Small Pox*, *Dysenteric Fever*, and in most continued ones, the worst Symptoms are owing to it. By § 13, 19, 21, 25, and 32.

VII.

VII.

There is a consent between the Skin and the Intestines, according to Baglivi's Observation. By § 19, 23, and 24.

VIII.

Plenty of cooling Liquors proper in the Small Pox and Inflammatory Fevers. By § 20, 26, and 32.

IX.

The Small Pox and Measles generally begin in January. By § 18, 19, 23, 28, and 31.

X.

A cold and moist Constitution of the Air disposes to an Epidemical Cough. By § 33.

XI.

Hypochondriac and Hysterical Persons are not to be treated like other People in Fevers, they cannot bear so large Evacuations. By § 34.

CHAP. VI.

Of Bathing.

§ 1. **T**O what I have writ concerning the *Air*, I shall subjoin some Thoughts of the Nature and Use of *Bathing*, by which we are render'd sometimes more, and sometimes less capable of bearing the Injuries of it, *viz.* the Air, according to the Heat, Temperature, or Coldness of the Bath. To which I shall annex some Observations upon, and Directions about wearing of Flannel.

§ 2. Tho' Bathing hath been mightily neglected in the last Age, yet it hath been the antient Practice both of the *Jews* and *Romans*, not only as a Cure of several Distempers, but also for Cleanliness and Delight. The Use of the Bath, especially the Cold, is so much reviv'd within this few Years, and the Success of it in the Cure of many Distempers being so extraordinary, I question not but, in a little Time, Bathing

K will

will be as much in vogue among us, as heretofore among the Antients.

§ 3. *Sanctorius* tells us, That Swimming in cold Water hinders Perspiration. (m) And,

That the Flux of the Belly is cured by promoting Perspiration, (*viz.*) by warm Bathing (n).

That *Hypochondrical* Persons are much eased, if their Bodies be render'd Perspirable by frequent Bathing. (o) And,

That Washing with cold Water heats robust Bodies, and refrigerates weak ones. (p) And,

Warm Bathing, unless Crudities withstand, helps Perspiration, and refrigerates the internal Bowels (q).

Bathing hath been often used with Success in the *Scab*, the *Leprosie*, *Elephantiasis*, and most Defædations of the Skin. In variety of Pains, as *Chronical Rheumatisms*, *Gout*, *Sciatica*, *Lamenefs*, from either too great contraction, or relaxation of the *Tendons*.

(m) *Aphor.* 67. § 1.

(n) *Aphor.* 92. § 1.

(o) *Aphor.* 102. § 1.

(p) *Aphor.* 1. § 2.

(q) *Aphor.* 2. § 2.

I sent a Gentlewoman to St. *Mongath's* Well, who was cured of an *Oedematous Tumor* in her Ankle by Bathing; which wou'd not yield to any Method that had been used, as Plaisters; discussive Fomentations, with *Sal Armoniac* dissolv'd in 'em, Tinctures of *Myrrh* and *Campfire*, Oyl of *Tartar*, *per deliquium*, laced Stockins, &c. She bath'd her whole Body once a Day, to give a general Contraction and Tensity to all the Vessels, and promote a dissolution and better circulation to all the Humors; but bath'd her swell'd Leg several times every Day, and kept it not too long in the Water at a time, for fear of chilling it; so that the Vibrations of the Fibres being made stronger and quicker so often in a Day, the obstructing Matter was remov'd, and the Vessels enabled to resist the distending Power of fresh Humors.

I am perswaded that a prudent Management of the Cold Bath, wou'd be very powerful in the relief of *Cachectie* and *Hydropic* People, provided the Distempers be not too far advanc'd, and some dangerous Symptoms in a *Consumption*, if the *Lungs* be sound, would better be remov'd this way than any

other : But this is not to be attempted without the advice of some judicious Physician. 'Tis a Specific in the *Rickets*; *Hæmorrhages*, whether from the Nose, Guts, or *Uterus*, are not only stopp'd by cold Bathing, but the return prevented. Nothing more certainly gives ease, and effectually promotes the passing of Stones in a *Nephritic* Fit, than warm Bathing. And (r) *Baglivi* tells us, That *Dolor Colicus fere semper mitigatur in Semicupio*.

Bathing will always act the part of a *Diuretic*. And plunging over the Head in cold Water, especially in *Sea Water*, will do more in the Cure of Melancholy, Madness, and particularly of that occasioned by the bite of a Mad Dog, than any other Medicine. There is nothing more adapted to the Cure of *Frigidity*, when owing to a former excess of *Vener*y, than the Cold Bath.

It will also contribute its share to the Cure both of a Simple *Gonorrhæa*, and *Fluor Albus*. 'Tis often successful in a *Palsie*, and they who use it much are very little affected with the change of

(r) De Praxi Medica, p. 70.

Weather; and yet the abuse of Bathing is very prejudicial; for Bath-guides are generally of a pale and ghastly Countenance, of a bloated Habit of Body, with ulcerated and swell'd Legs, which often ends in a *Dropsy*.

§ 4. Tho' Bathing hath been us'd with Advantage in all the Cases I've mention'd; yet there is scarce any of 'em all but in some Circumstances it would be prejudicial: So that to reap the best Advantage we can by reading the History of Cures perform'd by it, it is fit we should enquire what Alterations are made by it in a Human Body, that so we may know in what Conditions to order it, and what not.

§ 5. I've already observ'd, That our Bodies are press'd upon by a Weight of *Air*, when the *Mercury* stands highest in the *Barometer*, equal to 30900 Pounds *Troy*. Now if this Weight be either considerably encreas'd or lessen'd, as 'tis often upon the change of Weather, and the influence of the *Planets*, it will certainly make a great alteration in the Fluids of our Bodies, as I have proved before: But this pressure is never so much augmented as when we Bath ourselves: For *Water* being above 800 times

heavier than *Air*, must needs greatly encrease the pressure: And a Body sunk 35 Foot in Water, sustains double the Weight it does in the Air; and though when we are near the top, the pressure upon our Bodies is mightily lessen'd, yet 'tis much greater than in the open Air, so that all the consequents of a greater pressure will happen upon Bathing.

The tender *Fibrilla*, of which the Skin is compos'd, being unequal in Strength and Tensity, some of 'em will more resist the pressure of the Water than others; from whence proceeds that *Rugosity* of the Skin upon Bathing.

§ 6. 'Tis certain that the surface of the Body, and those Parts adjoining to it, will be the most and first compress'd, and those at the Center the least and latest; so that the Blood will be forced in great plenty upon the *Viscera*, where there is the least resistance: For this Reason it is never safe for those to Bath who have weak or ulcerated Bowels; nor can they, without danger of Life, or Swooning at least, who have a very weak Pulse, enter into a Cold Bath. The 4th *Aphorism* in the 3d §. is only accounted for this way, viz. *That cold Bathing heats robust Bodies, and refrigerates*

rates weak Ones : For the contraction of the Heart in robust Bodies being strong, makes the greater Conflict with the resistance it meets with in promoting the circulation of the Blood in such as enter the Cold Bath ; whereby the Blood is more broken, and the hot Particles set at liberty. On the contrary in those who are weak, the contraction of the Heart is but just able to continue the Blood in its circulation, which will, by reason of the resistance it meets with, be slower than before, and therefore they will have a sense of Cold, or be refrigerated.

§ 7. One that goes into a Cold Bath, if he plunge not himself over Head, is subject to the Head-ach ; the reason of this is plain, from what I have observ'd before ; for there being the least resistance to the circulating Blood in the Head, which is press'd upon only by the Weight of the Air, it will run in such plenty thither, as to distend the Vessels beyond their usual Tone, and thereby occasion a Sense of Pain. And why People are so chearful, brisk and lively after Bathing, is not only because the perspirable Matter is thrown off more plentifully, (according to *San-*

Florius's Observations (s) viz. *Melancholy is overcome by a free Perspiration, and (t) Chearfulness, without an evident Cause, proceeds from Perspiration succeeding well*) but also from a Sense of less Weight upon the Body. A Person two Foot under Water (as they often are who use Bathing) sustains a Weight of Water added to that of Air (supposing still the *Area* of his Skin to be equal to 15 square Feet) equal to 2280 Pounds for 2, the number of Cubical Feet of Water pressing upon a Foot square of the Skin $\times 76$, the number of Pounds in a Cubical Foot of Water is $= 152 \times 15$, the suppos'd Number of square Feet on the surface of the Body is $= 2280$ Pound Troy.

§ 8. So that the first and most obvious Consequence of Bathing, is by a greater pressure upon our Bodies to straiten the Vessels, and thereby dissolve the Humors, and make 'em fitter to pass the Glands to be evacuated, as also to squeeze out any Viscid Obstructing Matter that sticks to the sides of the Vessels, and renders the motion of the

(s) *Aphor.* 17. § 7.

(t) *Aphor.* 23. § 7.

Fluids of our Bodies more free and easy. In the next Place, they who enter into the Bath have the quantity of their Blood mightily encreas'd in the *Brain* and *Viscera*, being forc'd thither where there is the least resistance ; and the quantity of separated Matter in any Gland, being as the quantity of Blood multiply'd into its Celerity at the respective Glands, (u) the quantity of *Animal Spirits*, of *Urine*, of *Gall*, *Succus Pancreatis*, &c. will be mightily encreased, and any impediment to the Secretion of these Fluids will probably be removed, these Liquors flowing with a greater celerity. So that,

1. If we wou'd have the Blood dissolv'd, 2. or any Viscid Matter adhering to the sides of the Vessels remov'd, 3. or the Glands scour'd, 4. or a greater quantity of Spirits generated and moved with greater celerity through the Nerves, 5. or wou'd force Urine, 6. or remove obstructions in the *Liver*, *Spleen*, *Pancreas* and *Mesentery*, if they be not grown too obstinate, in which case 'tis dangerous, we ought to order Bathing.

(u) Pro. 17. Of *Animal Secretion*.

It is for the 1, 2, and 3d Reason, that it cures the *Itch*, *Leprosie*, and *Elephantiasis*; it is for the 4th Reason, together with the former, that it cures the *Palsie*, *Melancholy*, *Madness*, and the bite of a *Mad Dog*; it is for the 5th that it helps the passage of Gravel; for the 6th join'd with the other, that it helps *Cachectic*, *Icteric*, and *Hydropic* People, before the Distempers be too far advanced.

§ 9. These Ends which are compass'd by a greater pressure, are more effectually obtain'd by whatever encreaseth the Weight of the Water, or contracts the Fibres of our Bodies; it is the Salt in the Sea-Water whereby its Weight is increas'd, that makes it more useful in the cure of those who are bit with a *Mad Dog*; and the deeper you plunge 'em the more effectual will it be, for a Reason that I have given before.

We know by Experience, that Cold contracts, and the more suddenly it is apply'd to our Bodies, the more violently it operates; but how much it contributes to the obtaining of the forementioned Ends we cannot certainly know, having no Rule by which we may measure the quantity of Contraction caused by it.

But

But that it is very considerable we need not doubt, having so many Experiments to prove it. The Contraction of the Fibres is propagated throughout the whole Body, upon which Score all the Humors in the Body must be propell'd with greater force through the Vessels in which they circulate; besides that the Tensity of the Fibres being greater, their Vibration will both be quicker, and stronger, and that in proportion to their encreased Tensity) so that the Blood and Spirits will not only move more swiftly through the Canals, but also be extremely ground and broken; from whence all the effects of more Fluid Blood and Spirits, moving with greater Velocity, will necessarily ensue upon using the Cold Bath. These Things which I've said, compared with the Constitution of the Patient to whom Bathing is prescrib'd, will give you the time he ought to stay in it, the number of times, (with the intervals between them) he ought to use it, the necessary Preparations for it, and what is to be done after it.

It is upon the account of the contracting Power of the Cold Bath principally, that it stops *Hemorrhages*, *Gonorrhæas*,
and

and the *Fluor Albus*, as also that it cures *Venereal Impotency*.

Where the peccant Matter hath been made more Fluxil, either by Medicines, Diet, or a regular Use of the warm or temperate Bath, in Chronical *Rheumatisms*, *Gout*, *Sciatica*, *Lamenefs*, &c. the violent contracting Power of the Cold Bath will often perfect the Cure. A *Nervous Atrophy*, which (w) *Baglivi* probably conjectures to be owing to an universal relaxation of the Nerves which terminate in the Skin, is as likely to yield to the Cold Bath as any other method, provided the Pores, by Contraction, were not shut up too suddenly; for it would then throw the detained Matter upon some other Glands, whereby an Evacuation more dangerous might succeed.

§ 10. The next property of the Bath, distinct from its Weight and Coldness depends upon its being *Moist*, and by this quality of the Water, it softens, relaxes, and makes pliable all the Parts of our Body, as sufficiently appears by steeping any part of an Animal Body in Water, even the Horns and Hoofs of Beasts will

(w) De Fibra motrice & morbosa, p. 67.

become soft and flexible, by a long immersion in Water, especially if warm.

And that Water, as moist, hath a property of relaxing, as 'tis prov'd by Experiment, so 'tis no way inconsistent with what I've said of the pressure of Water in general, nor the contracting force of the Cold Bath in particular, the pressure of the Water is consistent enough with relaxing and softning of Bodies that are immers'd in it; for the Weight of the Water will enable it to insinuate it self into the Pores of the immersed Body, whereby it will become more soft and flexible; and yet before it hath done this, will force together the sides of any yielding Vessel, such as those of a Humane Body are, and thereby press out their Contents with a Velocity proportionable to the Weight incumbent on 'em: So that after the Humors have been put in violent Motion by the pressure of Bath-Water, if the Person stay any considerable time in, he will have the Solid Parts of his Body softened, relax'd and made flexible. This Hint is of great use to determine the time our Patients ought to stay in the Bath in some Distempers more than others.

Now I shall enquire how the contracting

tracting Power of Cold, and the relaxing Power of Moisture can agree in the same Subject: That they cannot act intensely at the same time, but their actions will destroy the effect one of another, is evident to any who consider that contrary Qualities are inconsistent in the same Subject, at the same time; but as I observed in the last Section, Moisture acts very slowly, and must be a long time in performing its work, whereas Cold acts quickly and on a sudden, as we know by a multitude of Experiments: Wherefore tho' the Cold Bath may contract at first, yet by staying too long in it, it would relax; but there are none who are able to bear the Cold so long as to produce the latter Effect. The principal reason why Cold so violently contracts the Membranes of our Bodies, is by making an ungrateful Sensation, for such is the frame and constitution of the Animal Oeconomy; that the Soul has a Power of contracting, or relaxing, the Membranes, and Vessels of the Body, so, as best to serve the purposes of Life; and tho' we know not how the Soul operates upon the Body, yet would it be the greatest Folly to deny that which we daily experience

ence to be true: We every Day observe by the command of our Wills, that the Members of our Bodies are mov'd a thousand different ways, and 'tis as easie to imagin the Soul acts immediately upon the Nerves and other Solid Parts of the Body, as upon the Animal Spirits, being that Spirit can act as easily upon Solid Matter as that which is Fluid; the mode of its operating being altogether unknown to us. In a relax'd State the Body is Weak, Feeble and Unactive, and in this condition it is in all the Passions which are attended with Pleasure: On the contrary, whatever Passions of the Mind are attended with Pain, Grief, or any kind of Uneasiness, as Malice, Revenge, Fear, a Fright or Surprize, puts the whole Body into a contracted State, as appears by the shrinking the Veins, sparkling of the Eyes, contraction of the Pupil, paleness of the Face, and especially of the Lips; and this is none of the meanest displays of infinite Wisdom and Goodness, for the preservation of Man: For by this means he is strongest when he has the most occasion for it, either in resisting Force when he thinks he can overcome it, or else in flying from it; in doing of which upon a Fright,

Fright, some have exerted such agility of Body as is almost past Credit, were it not the common Observation of Mankind how Vigorous and Active we are in such Circumstances. The reason of this excessive Strength when the Vessels of the Body are contracted, is evident from Dr. Cbyne's Proposition about the Strength of Animals, (*viz.*) 'That 'tis ' in a triplicate Proportion to the quantity of Blood running in the Vessels: Now the quantity of Blood is mightily encreas'd, in the proportion it bears to its Vessels, when they are contracted, to what it is when relaxed, for 'tis the same thing to all intents and purposes, whether the Vessels continue of the same wideness, and the quantity of Blood be encreas'd, or the quantity of Blood continue the same, and the Vessels in which it runs be straitned or contracted; so that we may expect the same Strength in an Animal, whose Vessels are contracted to half their wideness, as we may from an Animal whose Vessels are in their former condition, and the quantity of his Blood doubled; so that besides the advantages common to all sorts of Bathing, there is this peculiar in the *Cold Bath*, That
it

it gives a violent and universal Contraction to all the Membranes and Vessels of the Body; and there is nothing so surprizing in the sudden Cures it performs, but what is accountable from this Cause.

§ 11. But Water hath certainly a softning, relaxing Property, when apply'd to our Bodies, and by means of this 'tis able to bring about great alterations, and as the pressure of the Water is made more effectual by Cold, so is its relaxing Power by a moderate Warmth: For a gentle Heat always relaxes the Fibres of our Body, by being pleasing and agreeable to the Sense of Feeling: So that when we wou'd have the benefit of an universal Relaxation, we ought to go into the temperate Bath, such as *Buxton*, being the most temperate of any that I know of in *England*. The first Advantage that many receive from the Use of this Bath, is an entire Refreshment after Weariness with a Journey. 'Tis a common Custom for Persons wearied with Riding, as soon as they alight, to go into the Bath for a little time, by which means they become as lively and brisk as they were in the Morning: For Weariness being nothing but an overstretching, or too great a tensity of the

L Fibres,

Fibres, occasion'd by using them too long or too violently, must, upon their being relax'd, go off again: 'Tis for the same reason that Sleep takes off Weariness.

§ 12. This universal Relaxation caused by Bathing will so widen the Pores, that a vast quantity of perspirable Matter will be carry'd off; more than at another time: 'Tis for this reason that some corpulent People have, in a Fort-nights time, lost above two Stone Weight by using of this Bath; and all the advantages of a free Perspiration may be gain'd this way, tho' it be true, we are more obnoxious to catch cold afterwards: Yet I think a cautious Use of the *Cold Bath* after the *Hot*, might not only prevent that Inconveniency, but in many cases render it much more beneficial. I've known that Bath I am speaking of, to remove violent Pains in the Head, Back and Joints. A Gentleman of my Acquaintance had a fixed Pain in his Breast for almost two Years, and was reliev'd by four or five times Bathing in this Bath. It helps a Chronical *Rheumatism*, *Gout*, and the *Colick*, *Lameness*, *contraction of the Tendons*, &c. and how all these are perform'd is easily known by the foregoing Theory. But,

§ 13. All the Effects of Warm Bathing are better brought about by the Water insinuating it self into the Body thro' the Skin, for being mixed with the Blood, it doth dilute and dissolve the Acrid Salts in the *Serum*, by which they are better carried off, thro' the proper Glands design'd for their Evacuation: So that 'tis useful in all Distempers where too much Salt abounds, as the *Scurvy*, and most *Cutaneous Diseases*.

Tho' it be a general receiv'd Notion that Bath Water enters into the Body, and so mixes it self with the Blood, yet most believe it upon very indifferent grounds, or having never examin'd the Reason of the Thing, nor consider'd the Objections against it. That Water hath a wonderful Power of insinuating it self into any contiguous Body, appears from several Experiments. We see how Deal-boards will swell against Rainy Weather; the watry Particles floating in the Air, by the pressure of the Air upon 'em, are forced into the slender Tubes of the Wood, where they meet with no resistance, the Particles of Air being too large to enter the same: It is certain, however true the contrary may appear to be, that the

compounding Particles of Water, are less than those of Air, being the former will pass thro' several Bodies that the other will not. It will force it self thro' the Skins of Animals even after they are dry'd and converted into Leather. (x) *Bellini* try'd the Experiment upon the Skin of a Man's Head, which after it was moderately dry'd, suspended it with a Stone in it, to sink it in the Water, and in a few Hours time the Water had forced its passage thro' it: But nothing shews more the Force of Water to enter into contiguous Bodies than the following Experiment.

Fasten a piece of Whipcord, or a strong Rope, of what length you please, (but the longer the more visible will the Experiment be) to a Hook, or Staple, and at the bottom of the Cord hang any weight short of what will break it, tho' never so great: You will find that the weight will rise in moist Weather, and sink lower in the Dry: You may also raise the Weight by moistning the sides of the Cord by a wet Sponge; by this means a few Particles of Water may overcome any finite

(x) *De Urinis & Pulrib*, p. 146.

Resistance, if the Cord would bear it. Now since there is but a little quantity of Water, and that driven into the sides of the Cord, with a force no greater than the Weight of a Cylinder of Air incumbent upon the Water; therefore must the Water act by some property whereby its force is greatly augmented, and that can be no other than that of the *Cuneus*; and the forces of Wedges are to one another reciprocally proportional to the Angles their edges make; but in Spheres the greater or lesser degree of Curvity is to be consider'd, as their Angles, when Spheres are consider'd as Wedges; and the degrees of Curvity in Spheres are reciprocally as their *Radii*. Now the Particles of Water being so infinitely small, less by much than those of Air, must, when acting as Wedges, have their Powers infinitely increased, so as to overcome any finite Resistance: Now let the Resistance the Water meets with, in entering into our Bodies be what it will, yet 'tis hard to believe it's greater than what I've mention'd, which yet a little quantity of Water will overcome. The Experiments I have taken notice of, were made upon the Skins of Dead

Men, or Beasts, which would have put the Matter beyond dispute, had they been made upon such as were alive. The only difference then being that in the Living, Steams or Vapours are constantly raised into the Air, through the pores of the Skin, in Insensible Perspiration; which is not so, in those that are Dead. These Vapours, tho' raised with a considerable force, are yet unable to withstand the *Impetus*, with which Water endeavours to insinuate it self into contiguous Bodies, being so great as I have explain'd. And tho' the quantity of perspirable Matter, is very great in 24 Hours, being (y) $\frac{1}{2}$ of the Meat and Drink a Man takes in a Day; yet if we compute the quantity that perspires from any part of the Skin, in a given time, we shall find it too little by far to hinder the entrance of Water into the Body when we go into a Bath. For Dr. Pitcarne (z) hath demonstrated that the matter of Insensible Perspiration in a Minute, is the 1200 part of the place it comes from, (*viz.*) $\frac{1}{1200}$ of the

(y) Sanctorii Medicin. Stat. Aphor. 6. Sect 1.

(z) Dissertationes Medicæ, P. 130.

Skin perspires $\frac{1}{1200}$ in a Minute, and consequently $\frac{3}{4}$ of the Skin perspires $\frac{1}{1200}$ in a Minute; now suppose a square Inch of the Skin weigh $\frac{3}{4}$ then a square Inch perspires $\frac{1}{1200}$ in a Minute; but a square Inch of the Skin is pressed upon by a Weight when we Bathe, more than in the open Air, equal to 96 Drams. For we may conclude that our Bodies, taking one part with another, are two Foot under Water when we Bathe our selves: So that every square Inch of our Skin must bear the Weight of 24 Cubical Inches of Water equal to 96 Drams: For a cubical Inch of Water being $\frac{3}{4}$ $\frac{1}{1200}$, throwing away the Fraction, 24 cubical Inches must be 96 Drams: Now since only the $\frac{1}{1200}$ of Matter is perspired through a square Inch of the Skin in a Minute, therefore is the Elevation of the perspirable Matter resisted by a Weight 115200 times greater than it self; for $1200 \times 96 = 115200$. How great then must be the Celerity with which the perspirable Matter moves, if we imagine it able to raise a Body 115200 times heavier than it self? Thus would it be, if the whole quantity of perspirable Matter evacuated in a Minute,

was to exert its force at once upon the incumbent Weight of Water; but it is so far from doing that, that, if the exhalation of the Steams be not continual, as the pressure of the Water is, yet the intervals betwixt the times they are propell'd from the Body are very short; suppose 60 of them in a Minute, being about the number of Pulses that a healthful Man's Artery beats in the same time; Then will the quantity of Vapour, which exerts its force at once against the incumbent Water, be sixty times less than what I first assign'd; which being multiplied by 1200 = 72000, the number of Parts into which a Dram of perspirable Matter is divided, one part only of which exerts its force against 96 Drams of Water in a second: So that the perspirable Matter that rises, every Second must raise a Weight 6912000 times greater than it self, if it resist the entrance of the incumbent Water: for 90, the number of Drams of Water, incumbent upon an Inch square on the Skin, multiplied by 72000, the number of Parts into which a Dram of perspirable Matter is divided, is = 6912000 the difference between the quantity of Matter perspired in a Second,

cond, and the quantity of Water by which its Motion is resisted.

I think by this time it sufficiently appears that the Bath Water will mix it self with the Humors of the Body, so that there is nothing so wonderful in Bathing, but what may be accounted for from some of these Properties of Water I've mention'd, without having recourse to the Salts with which Bath Waters are impregnated; which yet may contribute their share in the Cure of some Distempers. What I've said about Bathing, as 'tis mostly new, so are my Reasonings founded upon known Experiments; and how just my Inferences from 'em are, I leave to the Judgment of my Reader (supposing him to have the necessary Qualifications and a moderate Attention) to determine.

§ 14. To apply the general Proposition, viz. That Bath-Waters act upon a Humane Body by their Weight, (by contracting or relaxing the Solid Parts, and diluting the Fluids of the Body) in all Distempers wherein Bathing might be beneficial, or injurious, wou'd take me up more time than I've now to spare, tho' I may, perhaps, find a more seasonable opportunity of doing it.

Of

Of wearing Flannel.

I shall now, according to my Promise, say something concerning the wearing of Flannel. By what Fate so many of late fall in with an Opinion of the advantage of wearing it, I can't tell; but this I'm well satisfied of, that it does hurt to two for one that receives benefit from it, and there is none to whom Flannel is more prejudicial than those to whom 'tis generally prescrib'd, being Weak, Faint, or Hectic People; indeed it must be confess'd that there are some that receive benefit by it, but they are very few, and I question not but some ascribe that to Flannel, which is owing to some other Cause unknown, and which had perform'd the Cure both more speedily and perfectly, had the Person never us'd it.

A Man of a robust Constitution, who eats and drinks well, and yet uses not Exercise enough to throw off the Remains and Dregs of a full and nourishing Diet, and who is subject to *Defluxions*, *Catarrhs*, *Pains* in the *Joints*, and such Distempers as are owing to a *Plethora*, will receive benefit by wearing

ing Flannel, tho' too long an use of it may so relax the Tone of the Fribres of the Skin, as to hinder that Perspiration which before it help'd: For tho' the quantity of perspirable Matter be in proportion to the wideness of the Pores of the Skin, yet they are not the widest when the Skin is most relaxed, however 'tis necessary that the Skin be considerably relax'd, that the Pores may be encreas'd to their greatest Diameter.

The most certain and constant effect of wearing Flannel, is to make a more free and plentiful Perspiration, which tho' it be attended with great advantages, (according to (t) *Sanctorius*) when moderate, yet when excessive nothing is more pernicious. The other Effects we observe from it, as they are more uncertain, so are they but the consequences of this; now since the encreasing of one Evacuation is the lessening of another, therefore whenever too much is thrown off from the Blood either by Stool, Urine, or Spittle, it may be proper to wear Flannel.

(t) *Medicin. Statica. Aphor. 10, 42, and 44. § 1.*

Both *Walthmeidt* (u) and *Baglivi* (w) observe that *Diarrhœa*'s from immoderate Grief, are incurable; and that principally from a suppression of Perspiration, Grief contracts the Skin as all troublesome Passions of the Mind do; so that the perspirable Matter being retain'd, will be thrown upon some other Glands, and if on those of the *Intestines*, will continue a *Diarrhœa*. 'Tis also observ'd, that *Ufus Veneris* makes the Body Costive, and this it does only by promoting Perspiration by an universal relaxation of all the Fibres, which is always proportional to the intenseness of the Pleasure; and for the same reason 'tis that weak Persons are subject to a Looseness in Winter (when the cold Air shuts up the Pores of the Skin) which they are free from in Summer. In a *Dysentery* the last mention'd Authors above all things order the Body to be kept warm, and especially the Feet, to promote Perspiration; and the latter observes a consent between the Skin and the Intestines, as *Hippocrates* did before him.

(u) De *Diarrhœa* inter *Monita Medica*.

(w) De *Praxi Medica*, p. 76.

Sanctorius in his 46 *Aphor.* § 1. tells us, That the perspirable Matter retain'd, neither being resolv'd by Nature, nor a Fever supervening, disposes the Body presently to a malignant Fever. And *Dr. Cockburn*, in his *Treatise of the Distempers of Seafaring-Men*, gives Instances enough of Fevers from a suppress'd Perspiration. In such Cases as this, whereby the preceeding Symptoms (as a dejection of Appetite, spontaneous Lassitude, sudden Loss of Strength, a Stupidness, with Inclination to Sleep, the want of usual Stools, &c.) a Fever is threatned, nothing will contribute more to prevent it, than restoring Perspiration to its wonted freedom; and Flannel may very well act its part in this Scene. But these Cases I have taken notice of, are such as Flannel is seldom or never order'd in, tho' in these only we may expect advantage.

That it may appear how prejudicial Flannel is to those who perspire too much, as most weak People do, and to whom the wearing of Flannel is generally prescrib'd, I shall observe from *Sanctorius*, That insensible Perspiration is double to all the sensible Evacuations made by Urine and Stool

put

put together; and that 'tis to that made by Stool as 40 to 4, (c) so that 'tis Ten Times greater than that by Stool; therefore a Man will be made no weaker by having Ten Times as many Stools as he us'd to have, than he will be by perspiring only double the quantity he does at other times; further, if we consider that the greatest part of our Stools are the remains of our Food that cou'd not enter the Lacteals, we shall find the difference much greater; for we can't imagine that above one Tenth of that we void by Stool, is evacuated from the Mass of Blood, by the *Liver, Pancreas, and Intestinal Glands*; so that upon this account there is as much deriv'd from the Mass of Blood in one Day by Perspiration, as by Stool in a 100; therefore if Perspiration by any means be doubled, in 24 Hours it will make a Man as faint as if he had 100 Times more Stools in the same time than usual. And there is none but who expect a weakness from an unusual Purging, and we daily experience the sudden danger of a *Diabetes*, wherein the quantity of Urine

(c) *Medicin-Statice, Aphor. 59. § 1.*

is encreas'd, but take little notice of an encreas'd Perspiration, because *insensible*, for which reason we are apt to ascribe the Mischief it occasions to some other Cause.

A Consumptive Gentlewoman in *Shelfield*, by the Advice of a Physician, putting on a Flannel Shift, tho' she was able very well to walk about the House, in two Days Time was confin'd to her Bed (from whence she never rose) without any other evident Cause than wearing Flannel.

If what I've said be of force enough to perswade any to leave off wearing it, I wou'd advise 'em to do it in a warm Season, and at the same Time, either make use of the Cold Bath, or the *Flesh Brush*, which will prevent the Inconveniencies that otherwise wou'd attend it.

I was perswaded to wear Flannel next my Skin, above ten Years ago, for a severe Cough that I had got; by which, I think, I receiv'd some Advantage, but after I had worn it a Year or two, I found it very troublesome and prejudicial to my Health; it made me so exceeding tender, that I was not able to bear the least Cold; and

I found by the Experiment of leaving it off, how much it dispos'd me to faintness, which I mightily suspected before, and therefore I attempted several times in vain to get quit of it, but cou'd not, without some Inconveniency, greater than I was willing to bear, till about two Years since, in a hot Season going into a Cold Bath, I left it off without any damage.

C H A P. VIII.

Of Meat.

§ 1. **A**N Animal Body wou'd be little better than a clod of Earth; were it not for the vast variety of Action 'tis enabled to perform, and this it does by means of an infinite number of small contractile Fibres, which in every contraction and distraction, which are Millions, in a Day, by their attrition one against another, file off from one another vast numbers of little separable Parts, by which the Fibres daily grow weaker, and wou'd soon be unfit to perform their function, were they not as constantly repair'd as they are diminish'd. And whenever the Fibres are in a state of Relaxation, their Pores being open'd; then are they in the fittest condition to have new Matter by the force of the circulating Humors impacted to them, and in this condition are the Fibres when the Animal is asleep. So that as waking is the Time of spending

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ing, so is sleeping the time of recruiting ; hence by the by we may observe the necessity of sleeping.

§ 2. Now 'tis our Food, whether Fluid or Solid, that furnishes us with this Supply, and all that is necessary to qualify it for this purpose, is only that it be by the force of the *Stomach* and *Lungs* divided into Parts small enough to enter the *Poruli* of the decay'd Fibres.

Hence we may deduce the Necessity both of taking in Food, and also of the Circulation of the Blood, for if either of these were wanting, there would be no means left of repairing the loss the Fibres sustain by their daily contraction.

So that if a Man wou'd not destroy his Health, his Exercise shou'd be proportion'd both to his Eating and Sleeping: And Mr. *Fuller* in his *Medicina Gymnastica*, (tho' in other respects it be an useful Book) is mightily out of the way in prescribing Exercise, and that violent too, without any distinction to all sorts of People that can but bear it, nay, tho' they cannot without being extremely tir'd. I should have referr'd this to what I shall say about Exercise, but that it follows so naturally from what
what

what I have but just now advanced.

§ 3. Now that we might not neglect a Supply so necessary to the Preservation of our Body, the bountiful Author of our Being and Happiness hath furnished us with two Appetites, the one to Solids, which is called *Hunger*; the other to Fluids, which is called *Thirst*; what they are is better known by Experience, than by the best Definition, and as they are a *Stimulus* to the gratifying of Nature's cravings, so would they be the surest Guides both as to the Quantity and Quality of what we either Eat or Drink, were it not that most Men have vitiated and debauch'd them by Irregularity and Excess. Our Skill in the Animal Structure is not such as to determine exactly either the Quantity or Quality of what we take into the Stomach, so as best to answer the end of Eating and Drinking.

Tho' *Sanctorius* (a) gives a Rule to measure that quantity of Food, which is best suited to our Health, viz.
' Observe in the Morning, after a some-

(a) Medicin. Stat. Aphor. 64: § 1.

' what plentiful Supper over Night,
 ' what the Perspiration in the space of
 ' twelve Hours comes to; suppose it
 ' comes to fifty Ounces; then another
 ' Morning, after fasting over Night, but
 ' with this Condition, that thou didst
 ' not exceed at Dinner the Day before,
 ' make the same Observation, as sup-
 ' pose the Perspiration to have amount-
 ' ed to twenty Ounces; so having made
 ' these Observations, pitch upon that
 ' proportion of Meat, and other *Non-*
 ' *Naturals*, as may reduce the Perspirati-
 ' on to a mean between fifty and twen-
 ' ty Ounces, and that will be thirty five
 ' Ounces, and that is the quantity sought
 ' for.' This *Aphorism* is so far from be-
 ' ing an unerring Rule, that 'tis faulty in
 ' several Respects, for the same quantity
 ' of some sorts of Meat and Drink, will
 ' almost expel double the quantity of per-
 ' spirable Matter, in the same time that
 ' other sorts will do it in.

In the next Place, some Persons, in or-
 der to their Health, should perspire ve-
 ry freely, and others more sparingly,
 according to several of his own *Apho-*
risms; so that after all we must have
 recourse to something else as our Direct-
 or in this momentous Affair, and that
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can be nothing but the two recited Appetites, which as they direct us in the quantity, so should they be the Measure of what quantity we either Eat or Drink. And in general so much may we Eat or Drink, till Hunger and Thirst be no longer troublesome to us, for whenever we exceed these bounds, we sow the Seeds of various Distempers, but yet as *Hippocrates* (e) tells us, the consequents of a slender Diet, are more fatal than of one that is more plentiful, wherefore 'tis dangerous for one in Health to live of too spare Diet.

§ 4. It is not only in this State of Health we are so much oblig'd to our Appetites, but even in most Distempers; were we to consult 'em, we should find 'em very good Guides, tho' not infallible. In *Inflammatory Fevers*, what more desirable than cooling Liquors? and in general nothing more beneficial. Or, what more detestable than *Cordials*, bitter *Alexipharmics*, and testacious Powders, such as *Coral*, *Pearl*, *Gascoine's Powder*, &c. and nothing more prejudicial? In *Hypochondrical Cases* the Appe-

(e) *Aphor. 5. § 1.*

tite is oft-times Voracious, and Thirst little or none at all; and nourishing Food in good quantity is one of the best Remedies for this Distemper. And as their Drink is but little, so would they have it to be strong and spirituous, both advantageous to the Hypochondrical. To produce all the Instances I could for the Confirmation of this Truth, wou'd be to give a History of most Distempers; but shall save my self the Labour, by appealing to the Experience of every judicious Physician.

§ 5. Our Food is to be consider'd with Respect to its Quantity, its Quality, and the Times of taking it.

In the first Place, 'tis more safe to exceed a little in the Quantity, than to come short, as appears by the last recited *Aphorism* of *Hippocrates*, as also from several others of * *Sanctorius*. And indeed the damage of a more full Diet, is soon remedied either by Exercise, or gentle Evacuations, but the decay of Strength, the natural consequent of too spare a Diet, is not so easily repair'd.

* Vid. *Aphor.* 15, 16, 32, 33, 40, and 44.

I am not here pleading for Gluttony, that being attended with the worst of Consequents, only wish that what I've said may be a caution to those, who from the various Histories they meet with of such as have lived a long Time by a spare Diet, are inclin'd to set upon the like Practice, the Mischief of which I've more than once observ'd. And in general those Instances, as they are but few, so are they of such as liv'd unactive and solitary Lives, the waft of Spirits being but little, their Supply need but be answerable to it. Tho' People who live of a spare Diet, are unfit for the fatigue of Business, or any hard Labour, yet such People, if their Exercise be not too great, live longer than those of a robust Constitution; and it is observ'd, That Men of a pale Complexion live longer than those who have one more florid; and with a low Pulse, than with one that is strong; the Reason is plain, for the Humors of the last Sort are more *Volatile*, and so more susceptible of any Impression from external Agents: Their Solids also being more Tense and Rigid, will upon all Occasions make their Vibrations more quick and strong, and so dispose the Body to all sorts of

Inflammatory Distempers; besides, being more subject to break by their greater Tensity, they will be liable to a more speedy decay by their greater Motion.

§ 6. They who use most Exercise should eat and drink most plentifully, by § 1. which should therefore be a caution to Men of a sedentary Life, how they indulge themselves either too much in eating or drinking; tho' when the *Meninges*, together with other Membranes, have been upon the stretch too long by intense and severe Study, a Glass of some spirituous Liquor *ad Hilaritatem* in pleasant Company, is so far from prejudicing the Health, that 'tis attended with great Advantages; for besides the promoting Perspiration, which was suppress'd by the foregoing Study, the over Tense Fibres are relax'd, and so capable of having that Loss repair'd they had sustain'd by a long continu'd Contraction.

§ 7. On the other Hand, Gentlemen that indulge to the greatest excess both in eating and drinking, can use no better Antidote against the Inconveniencies that otherwise wou'd attend 'em, than violent Exercise, if their Strength be
such

such as can bear it, and for this reason 'tis that some Gentlemen Fox-hunters survive so many of their drinking Companions, who do not use the like Exercise, the Fibres being so mightily relax'd both by the quantity and spirituousness of the Liquor they drink (for Drunkenness is attended with all the Signs of a general Relaxation, as stammering in the Tongue, staggering in the Limbs, Relaxation of the Cornea, Dilatation of the Pupil, &c.) will dispose the Body to Dropsies, the Jaundice, Consumptions, Apoplexies, Palsies, &c. (as appears by comparing the Theory of these Distempers with a general Relaxation) if these Consequences be not prevented by restoring the Fibres to their former Tone again, which nothing is so likely to accomplish as violent Exercise. I shall add no more to what I have said on this Head, lest I should anticipate what I have to say in the Chapter of Exercise.

§ 8. *Hippocrates* (f) tells us, That the aged require less Food than those who are younger, or in the flower of their

(f) *Aphor.* 13. § 1.

Age, and it was to the putting of this Observation in Practice, that the famous *Italian Cornaro* (yearly lessening the Quantity of his Food as his Age advanced) imputes, in a great measure, both his Health and *Longevity*, being in good Health at the Age of 120.

The Healthful also require more Food than the Sickly, as the Strong do more than the Weak, for the more we nourish distemper'd Bodies the more damage we do 'em, (g) and yet some Distempers do not only require a nourishing Diet, but that it should be administred in great quantities too if the Stomach will bear it, as the *Hypochondrical* Disease, a beginning *Dropsie*, and in all Cases where the Pulse is preternaturally weak and slow, provided Exercise be not neglected at the same time; a spare Diet is more proper in *Acute* Distempers than *Chronical*, and it must be most slender when the Disease is at its height. (h) So must it also be in the Paroxisms of intermitting. (i) As to the quantity, take the following Rules.

(g) Hippocrat. *Aphor.* 10. § 2.

(h) *Aphor.* 9. § 1.

(i) *Aphor.* 11. § 1.

§ 9. The quantity is always too much when it so distends the Stomach, as, 1st. To cause Uneasiness, and then by pressing upon the *Diaphragm* and the descending Trunk of the *Arteria Magna*, and the ascending Trunk of the *Vena Cava*, to give a difficulty of Breathing, and obstruct the Passage of the Blood thro' these Vessels, and thereby forcing a greater quantity than ordinary into the Head, so distends the Arteries, as in a great measure to obstruct the Passage of the Spirits thro' the contiguous Nerves, by which the Man becomes listless and sleepy.

2. A Man in perfect Health ought always to rise from the Table with some Appetite.

3. If either the Body or Mind be less fit for Action after Eating than before; that is, if the Man be less fit either for Labour or Study, he hath exceeded in the quantity.

§ 10. Our Food, as to its quality, is either from the Animal or Vegetable Kingdom, 'tis either more or less Nourishing, either Solid or Fluid, Simple or more Compounded.

§ 11. That taken from Animal Bodies seems best qualify'd for the recruiting of
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diminish'd Strength, and repairing the loss our Fibres sustain by daily Motion, consisting of Parts which have heretofore been apply'd to the same Use: Whereas our Vegetable Food must be converted into Nourishment, by the proper Action of our own *Stomach* and *Lungs*, which are much weaker than those of divers Animals we furnish our Tables with every Day; being the Solid Parts of an Animal are the very Matter with which they were nourish'd, amass'd together in a Solid Form, and the Nourishment of an Animal is but a little part of that Vegetable Food he lives on, as appears by the vast quantity of Excrements which are voided by such Creatures, therefore the same quantity of Flesh-Meat affords much greater Nourishment than Vegetables do. That it does so, is confirm'd by this Observation, that all Animals which live upon Flesh-Meat, as they eat less, so are they much stronger, and oftentimes more sagacious.

If an *English* Man eat a Pound of Beef at a Meal, a *Dutch* Man, who mostly lives upon Vegetables, will eat two Pound of Cabbage or Turnip, and yet be no stronger nor near so active as the

the *English Man* : Besides this, whatsoever is apply'd to any part of our Body for Nourishment, must be of a Volatile Alkaline Nature, as is evident from various Experiments upon the Blood, all which shew it to be fraught with *Alkaly Salts*, whether it be in a sound or sickly State ; for the Solution of *Sublimate*, curdles the *Serum* white, filings of *Copper* turns it in a Days time *Ceruleous*, *Syrup of Violets* and the Solution of *Turnsole* change it to a green, all signs of a predominant *Alkaly*. A distillation of the Fibres themselves afford an *Oyl*, *Volatile Spirits* like that of *Hartshorn*, and *Volatile Salt*. So that what Food soever is nearest allied to the Juices that nourish us, and affords the greatest quantity of these Principles, is fittest for that purpose. Now there is nothing bids so fair for this Character as *Flesh-Meat*, *Gellies*, *Broth*, *Soops*, &c. all which afford a great quantity of an Oily *Alkaly* : On the contrary, *Vegetable Food* as it is more Viscid, and so requires more labour of the Stomach to render the parts of it so small as to enter the *Lacteals* ; so is it stock'd with *Acid Particles*, which must be converted into *Alkaly* by the force of the
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Stomach, Lungs and Heart, before it be fit Nourishment.

§ 12. *Bread*, as it is the most Universal, so 'tis the most Nourishing of any sort of Vegetable Food, and 'tis more or less so according to the Grain 'tis made of, the different way of preparing it, and the time of keeping it before it be eaten. That made of Wheat is most Nourishing, especially if it be well freed from the Bran, but then 'tis digested more difficultly, and enclines them that eat it to be Costive; but if it be mix'd either with Rye or Bran, it loosens the Belly: Few Stomachs can digest it *Unfermented*, tho' some hard Labourers constantly eat it so. The better our Bread is fermented, the easier it is to be digested, for a great deal of that is done by *Fermentation*, which otherwise might have been done in the Stomach by *Trituration*; for as Digestion is nothing else but the reduction of our Food into parts small enough to enter the *Lacteals*, so the work of Fermentation is only an intimate division of the Fermenting Mass, whereby the *Cohesion* of its parts is lessened, and so becomes less Viscid, and easier converted into Chyle in the Stomach. 'Tis also more diffi-

difficult to digest Bread that is New, than that which is a Day Old, for the very same reason; the New being much more Viscid than the Old, and 'tis upon this account Panado's and Puddings made of Bread, agree better with weak Stomachs, than such as are made of Meal. I think it proper enough in this place, to take notice of the pernicious Practice of many who feed their Children with Milk Pottage, boil'd till it be almost as glutinous as Syzing; 'tis no wonder that such Children have windy Distentions of the Belly, sometimes Purge, and at other times are Constive, are troubled with the Gripes, and sometimes with Convulsions: Those Disorders are often better remov'd by an alteration of their Diet, than by any Medicine.

The Grain that is most in use is Wheat, Rye, Barly, Oats, Pease and Beans, (Rice is seldom us'd among us, but on a Physical Account, in order to bind the Belly, but oftentimes very improperly, being so difficult to digest) they only differ in their being easily or more difficultly digested, and in affording more or less Nourishment.

Wheat

Wheat is preferable to the rest; in both respects, yet Rye, Oats and Barly are good Food, especially if well prepar'd; Pease and Beans are too viscid, whereby they become windy, and offend the Head and Stomach.

This sort of Food, except when it proves too windy, is proper for Persons of a robust Constitution; whose Fibres are too tense, and whose Blood abounds too much with Alkaly Salts, for they all afford, in Distillation, a considerable quantity of Oyl and Acid. Upon which account they are fit to soften and relax the over tense Fibres, and also blunt and correct the Acrid, Alkalious Salts in the Blood: So that 'tis very useful in the *Scurvy*, *Leprosie*, and most other *Cutaneous Distempers*; 'tis also proper for those who are subject to inflammatory Distempers, as *Pleurisies*, *Rheumatisms*, or *Effervescences* of Blood, flushing *Heats* in the Face, or other Parts, the periodical *Asthma*, &c. Salads and Roots, of the cooling sort, and Sub-acid sweetish Fruit, which I need not name, being known to every Body, have pretty near the same Virtue, excepting that some of them are too flatulent to be used

used with safety by Men of weak Stomachs.

The hot Salads and Roots are most proper in those Cases, where Flesh Meat is beneficial; as 'tis in all Distempers where the Blood is too *Serous*, the *Motion too slow*, and the Fibres too *lax*.

§ 13. I've known Preparations from Flesh, even in slow Fevers, more useful than the most generous Cordials the Shops could afford. The first time I used 'em in this Case was upon my self, when; after I had been ten Days in a Fever, was seiz'd with such frequent fainting Fits, that my Life was in hazard every Day, tho' I took a great variety of Cordials, which always refresh'd me for the present, but their Force were soon spent, and my Fits return'd so often, that I was almost constantly drinking of my Cordials, till after a Day or two I resolv'd to try some good Chicken Broth, which, in little quantities, agreed well enough with my Stomach, and relieved me much more than my former Cordials. This encourag'd me, my Faintness continuing, tho' not so dangerous, to have it stronger, till at last it was as strong as

Mutton, Veal and Chicken, boil'd together, cou'd make it, and of those I took a Porringer every two Hours, for twenty Days together, which was so far from heating me, or causing any uneasiness, that I complain'd of nothing during all that Time, but my excessive Weakness: Notwithstanding which, I arose from my Bed every Morning, tho' with the utmost difficulty; without doing this, I verily believe I had lost my Life, tho' I used all other rational Methods that were suggested to me. The Reason why lying too much in Bed in great Weakness is so prejudicial, I shall account for in a more proper Place, but shall, before I conclude this History, observe to you, that of all the Cordials I try'd during my Fever, nothing reliev'd me so much as the *Cortex*, neither were the Effects of any Cordial near so durable. This Success, immediately upon my Recovery, encourag'd me to try the same Method with a young Gentleman, who, by the Advice of one who understood very little of his Case, was, in two Days time, twice blooded, vomited, purg'd, sweat and blister'd, which had so infeebled him, that he cou'd scarce speak or turn him in his Bed, his Pulse was
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slow and exceeding weak, and sometimes intermitting, his Urine pale, his Tongue cover'd with a mucous Matter, yet not thirsty; and all this brought about in two Days time: For when he was first seiz'd, his Fever was very acute, with all the suitable Symptoms of Thirst, Heat, Pain in the Head, &c. By eating plentifully of good Broth, and the interposition of some gentle Cordials, in a few Days time he was freed from all his dangerous Symptoms, and after that treated suitably to his Distemper, of which he recover'd: But just upon his Recovery was seiz'd with violent *Pleuritick* Pains, and I being out of Town, by the Advice of another, was twice blooded and confin'd to Water-gruel, by which means, though his Pain was never a whit abated, his Strength was mightily diminish'd, his Pulse was soft, weak and slow, which in a true *Pleurisie* is always *hard* and *quick*, therefore guessing the Pain to be owing to the Viscidity of the Blood, and the deficiency of the Spirits (whereby the Heart was disabled from contracting with that force which was necessary to carry on the Circulation, so that its difficult Passage through the

Capillaries in the Breast, was the occasion of that Pain) rather than to either the too violent Motion of the Blood, or the too great Tensity of the Solids (which must rather have been in a lax Condition at the end of such a Fever) therefore instead of pursuing the common Methods, I return'd him to his nourishing Diet and Cordials again, by which means, in a little time, his Pain was abated, and in twenty four Hours had quite left him, and then he recovered without any Relapse. I think those two Instances sufficient to show that all the Ends of Medicine are not to be obtain'd only by the use of *Drugs*, but if we wou'd serve our Patients in their greatest Exigencies, we must sometimes tread an unbeaten Path, but never without a trusty Guide to direct us, *viz.* Mathematical Reasoning founded upon uncontested Experiments. It is past doubt with me, whatever some Physicians say against *Theory*, which they don't understand, that 'tis not only useful, but a necessary Qualification of a good Physician. For one that understands the Structure of a Human Body, the Nature of the Solids and Fluids, the Manner how Animal Actions are performed, the

the Nature of *Secretion*, the Effect of either encreasing or lessening any Evacuation, the known Laws of Motion as apply'd to *Mechanics* and *Hydrostatics*, with the application of 'em to the Alteration made in Human Bodies, is *Cateris paribus* better qualified for a Physician, than one who is ignorant of these Things, as too many who bear a great Character in the World are, which for want of solid Reasoning, they maintain by a supercilious Look, and affected Gravity, whose Word ought no sooner to be taken for the Safety of any Medicine they prescribe (for the Prescription of which they can give no Reason) than that of a *Mountebank* upon his Stage, who will never fail of telling the People how many Hundreds he hath cured in all Distempers.

I wou'd not be mistaken in the foregoing History, as if I commended a nourishing Diet in all Fevers, whereas I think it dangerous in Ten to One wherein 'tis beneficial; and even in those where 'tis proper, 'tis not so in every *Stadium* of the Distemper. The more *Acute* the Distemper, the more slender the Diet, and *Hippocrates* tells us, That

a moist Diet is proper in all Fevers, especially for Children (*k*).

§ 14. It is a great Mistake to think that the Stomach will always digest Food that is liquid, better than that which is solid, since it is contrary to daily experience, tho' in general that Notion is true, but in many Distempers 'tis otherwise, nay, in the same Distemper Liquids agree with one Man, and Solids with another: But to determine when to prescribe the one or the other sort of Food, besides the Patients own Observation what is easiest to his Stomach, which is never to be slighted, this is the Rule. Whenever the Fibres of the Stomach are too lax, and its Cavity and Lining too much stuffed with a *viscid* Slime, then is solid Food more proper than that which is liquid. On the contrary, when the Fibres are too Tense and Springy, and the internal Coat of the Stomach robb'd of its slimy *Mucus*, then are Liquids more proper than Solids; the Pulse, the Urine, and especially the Spittle, give very probable Conjectures in what condition it is in those respects.

(*k*) *Apbor.* 16. § 1.

§ 15. Tho' compounded Food be very Delicious, and better fitted to gratify the craving of a luxurious Appetite, and suit the nicety of a weak or deprav'd one, for which Reason it may sometimes be allow'd, yet it is seldom or never so wholesome as that which is more simple, provided it be of easie Digestion, and afford good Nourishment. For the different degrees of Cohesion there are in the Ingredients of which *made Dishes* are compounded, must needs make the Digestion, or in other Words, the Dissolution of our Food into such Parts as are small enough to enter the *Leffels*, more difficult.

§ 16. As to the times of taking Food, I shall consider 'em in respect to their Number in 24 Hours, and as to their Seasonableness.

§ 17. It is the Custom of some to eat once, some twice, and some three times a Day; now the number of times a Man shou'd eat in a Day is to be determin'd by the Age, Strength, Appetite, quantity of Food he takes at a time, its quality as to its easie or hard Digestion; for the Young, the Weak, and those who take but little quantites at a time of Food that is easily digested, should

eat oftener than those who are of full Age, Strong, of a Voracious Appetite, who eat great quantities at a Meal of Food, which is difficultly digested. Every Man ought to eat so often as is necessary to supply the loss he daily sustains, by the Motions of his Muscles, so that they who have little Appetites, shou'd use but little Exercise, or eat often; for if Eating once a Day will not supply our daily Expence, we must eat twice, and if that be also defective, we should eat three times a Day. The Signs of too long Abstinence are, after Hunger, a Faintness with a peculiar Uneasiness about the Heart-Pit, a low and stringy Pulse, a Weakness in the Joints, Inconstancy of the Mind, and if it be continu'd yet longer, will bring on dangerous Symptoms, as *Lypothymies*, *Vertigo's*, *Epilepsies*, &c. the last of these I observ'd to happen to a Gentleman, by too long Abstinence, join'd with trouble of Mind, from his Misfortunes in the World; for as I was Riding with him at five in the Afternoon, having eat nothing all that Day, and very little for some Days before, fell from his Horse in a violent Epileptic Fit, having never had one before in his Life, nor
ever

ever since but once upon the like occasion; I got him into a House hard by, and by forcing some hot Ale into his Stomach brought him out of his Fit, and then perswaded him to eat some Victuals, and drink a Glass or two of Ale after 'em, by which he was mightily refresh'd, and recover'd without any other Medicine. And indeed nothing is more proper in such a Case whereby Abstinence, together with intense Thoughtfulness, all the Fibres of the Body were wonderfully contracted, and their *Elater* prodigiously encreas'd, than what wou'd cause a general Relaxation, as spirituous Liquors of all sorts do, first in the Stomach, and then in the rest of the Body; so that Ale, for want of other Cordials, became an excellent Medicine.

§ 18. There are some who do not only repair their daily loss by one Meal in 24 Hours, but encrease the bulk of their Bodies to a vast extent, as we may observe in some fat People; and I doubt not but that 'tis best for such to eat seldom, for more Reasons than only to prevent their further Feeding.

§ 19. But in general 'tis best to eat twice a Day, at such convenient distances

ces as that the Food taken at one time may be digested before any more be eaten. In order to determine this Matter, I shall observe what happens upon Eating plentifully, as also upon long Abstinence, even where the Stomach is not lost, but more voracious.

§ 20. Hunger, as all uneasie Passions do, puts all the Body into a contracted State, as Eating on the other Hand relaxes it, and the Relaxation is always proportionable to the pleasure of Eating, and this in proportion to the Hunger: So that those who fast till they be the most Hungry, as their Vessels are hereby the most contracted, so will they upon Eating be the most relax'd, all Secretions being nearly suppressed in the first Case, and mightily encreas'd in the second (*by the 17th Proposition of Secretion*) the Vessels being more tense in severe Hunger, their Vibrations will be smarter, and part of the Substance more easily worn off, and so dispose sooner to old Age, the Relaxation upon Eating being also greater than ordinary, would in some measure compensate for the loss by giving Liberty for the application of Nourishment to the worn Fibres, but that the time is improper, the
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Succus Nutritius of the preceeding Meal being all spent, and that of the present being yet in the Stomach, this Relaxation, tho' very great, will be of little use.

'Tis certain, that upon this greater Relaxation when the Stomach is cramb'd with Meat, 'tis less fit for Digestion ; for the force of the Stomach upon a little, is greater than 'tis upon a greater quantity of Food, and therefore a great quantity is more difficultly digested than a little, and the Fibres being weaker by Relaxation, is even unable to digest a moderate quantity, and for this reason 'tis, that a healthful Man ought to rise from his Table with some Appetite.

Thus the Digestion being weaker, the Chyle will be more viscus, the Motion of it through the *Duodenum* slower, and the Orifices of the *Lacteals* wider, by the suppos'd Relaxation ; upon all which accounts, a more viscid Chyle will be carried into the Mass of Blood, which generally requires more Labour to make it Fluid and fit for Nourishment, than they are able to bear who eat but once a Day.

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This greater quantity of Food, when 'tis well warm'd in the Stomach, will swell and rarifie it self, and that the more too, because the relax'd Fibres of the Stomach are not able to resist it, and so cause a windy Distention of the Stomach with some uneasiness at least; whereby Perspiration is suppress'd as well as by an empty Stomach (1), which is more or less inconvenient, tho' Custom may make it undiscernable: For I know several who eat but once a Day without any apparent Prejudice, which yet may be the means of shortning their Lives, tho' it seem not in the least to impair their Healths at present.

Besides this a great quantity of Chyle being poured into the Mass of Blood at once, and that but seldom, must needs make a great alteration in the Body, and put the Instruments of *Sanguification* more upon the stretch, than when a little quantity is pour'd in more frequently.

§ 21. I have observ'd before, that the times of Eating ought to be such, that the former Food may be digested be-

(1) Vid. Sanctor. Aphor. Sect. 3.

fore more be eaten, and it shou'd be also at such distance from Bed-time, that Digestion be nearly finish'd before we sleep, for the preparation of our Food by the Stomach, and the application of it to nourish the Body, are Actions so vastly different, that they are inconsistent one with another. Digestion is perform'd by Contraction, as Nutrition is by Relaxation, so that the Food shou'd be digested before the Fibres be relax'd in order to their Nourishment; besides Sleeping immediately after Eating, as it makes a more viscid Chyle, so does it derive more of it than ordinary into the Mass of Blood, thro' the enlarged Orifices of the *Lacteals*, and consequently produces all the ill Effects that we may expect from the Blood when too viscid.

§ 22. As to the most seasonable times of Eating in general, they are about three Hours after rising in the Morning, and four or five before going to Bed, as appears by comparing several *Aphorisms* of *Sanctorius*, viz. 57. § 1. the 20, 28, and 35. § 4.

The Body, upon waking, being put into a contracted State, if there be any remains of the last Meal either undigested

gested in the Stomach, or not sufficiently attenuated in the Veins and Arteries, or adhering to the Orifices of the Excretory Vessels, will, if not disturb'd by Eating or Drinking, so encrease the Celerity of the Blood's Motion, and the vibrating Force of all the Vessels, as both to digest the remaining Food, attenuate that which is too viscid, and expel that which lies at the Orifices of the Glands. And when these ends are once compass'd, then 'tis the fittest time to eat again, and this commonly happens between three and four Hours after rising, Perspiration (being the most plentiful two Hours after Sleeping, by the last *Aphorism*) ought by no means to be diverted by Eating: So that we ought not to eat till after this time, according to my Assertion, tho' 'tis true that the difference of Constitutions, together with the different way of Living some have from others, make some Alteration in this respect.

If we go to Bed before our Meat be digested, the Stomach will be disturb'd in the performance of its Orifice, by that general Relaxation that will happen upon Sleeping, and all the ill Consequents taken notice of in the last §. will ensue.

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The times of Eating should be different to those that drink a Bottle every Night ; for their Victuals ought nearly to be digested before they drink, or else their Suppers ought to be very slight, and of such Food as easily digests, and yet Solid rather than what is Liquid ; for a Reason I have more than once given in this Chapter.

CH A P. XI.

Of Drink.

§ 1. **W**ater is the principal Ingredient in all our Drinkables, and the purer or less mixed we find it either with Vegetable, Mineral, or Earthy Particles, the better it is. Its Purity is best known by its Transparency, its Fluxility, Insipidness, and Lightness; for there is no mixture but what will alter it in some of these respects, and as that Water is the wholesomest, which has the least number of foreign Particles mix'd with it; so there is none but what has some, as appears from Dr. Woodward's Experiments upon Vegetation; and 'tis from this mixture that 'tis liable to stink and decay upon its Stagnation, for these Particles being of different Gravities, will soon subside, whilst other emerge, and by their contrary Motions so break and divide themselves, as some of 'em to become specifically lighter than the Air, and in their Elevation strike the

the Nostrils with an ungrateful Smell, which when spent in the Air, and the rest of the solid Matter that was contain'd in the Water settled in its proper Place, the Water becomes sweet again, as we know by Experience. Rain-Water is the freest from Mineral Particles, but well stock'd with Vegetable, which is the reason that it so soon putrifies, otherwise it would be the most wholesome of any: But Spring-Water, tho' it be heavier than Rain-Water, yet being less apt to putrifie, is certainly fitter for common use, provided it will bear Soap, and the Fountain run with a strong Current.

Cor. 1. From what hath been said it appears, of what dangerous Consequence the *Stagnation* of our Waters wou'd be, and how kind Providence hath been to us by the *attractive* Force of the Sun and Moon, to make so violent an Agitation in the Sea-Water twice in every twenty five Hours, as we observe upon the flowing of the Tides. And Tempests, tho' prejudicial to the Mariners, yet seem necessary for the better obtainment of this end; for without Storms and Tides the *Ocean* in a little time wou'd be so corrupted, as both to poison the Fish,
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and also infect the Air with such quantities of putrified *Effluvia*, as in a little time would kill the Land Animals also.

Cor. 2. That our Water is fittest for Use after it hath stood some time in a cool Place to settle ; the earthy Mineral Particles will some of 'em fall to the bottom of the Vessel, and the Water become more clear and light.

Cor. 3. That Water should not be much boil'd before Use, as many do for the making of Tea and Coffee ; for tho' Boiling may promote the separation of any *Heterogenous* Matter from the Water, if it stand some while after to settle ; yet by evaporating the lightest, and therefore the best part of it, what remains must be so much the worse ; and most Water may be boil'd till it have a saltish Taste.

§ 2. It is so necessary to our Subsistence, that we cou'd not live a moment without it ; 'tis this Element that furnisheth all the Fluid part of our Humors, without which they could not circulate, and that dissolveth all the Salts in the Blood, whereby some are carried to their proper Places within the Body, and others to proper *Emunctories* for their expulsion from it. It serves to prepare
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our Food, and then for a *Vehicle* to convey both it and Medicines out of the Stomach into every little Meander of the Body both for Health and Nourishment.

§ 3. *Milk, Ale, and Wine*, are nothing but certain quantities, tho' in different proportions, of *Salts, Sulphurs, and Earth*, swimming in pure Water. The difference between *fermented* and *unfermented* Liquors consists in nothing but the different Proportion of the *earthy* Particles, and subtilty of the *Sulphurous* and *Saline* swimming in Water; for from *Muste*, or the unfermented Juice of *Grapes*, or from a decoction of *Malt* before Fermentation, may, by Distillation, be extracted great quantities of Oil, and the *Caput Mortuum* will be considerably more than after Fermentation, but when by Fermentation (which is only a violent agitation in any Liquor whereby the *Cohesion* of the Parts is alter'd, and those which are too heavy to swim in the Liquor sunk to the bottom, and such as are too light forced up to the top) the *Sulphureous* and *Saline* Parts are volatilized, that which before was Oil and essential Salt, now upon Distillation arises under the form of Spirits, and Volatile Salt, so that Spirit

is nothing but Oil and Salt subtiliz'd, or whose Parts are exceedingly divided; the pungency of Spirits upon the Tongue is owing to the sharp Salts now set at liberty, which were sheathed before in the viscid Parts of the unfermented Liquor.

§ 4. In all Cases wherein too many Salts abound in the Blood, such as the *Itch, Scurvy, Leprosy, &c.* unfermented Liquors (if cautiously used) are the most proper, as they also are for such who are subject to *inflammatory* Distempers, as *Pleurisies, Rheumatisms*, or the like. When we design to *relax* by Water-drinking, we should take it warm, if not hot, with the Infusion of some Drug or other in it to encrease its relaxing Virtue, such as the Roots of *Sarsa, China, Liquorice, Althaea, &c.* It may be mixed with Ingredients that will lessen its relaxing Property, such as *Coffee, Tea*, or any sort of bitter Herb; for all Bitters contract the Fibres of the Stomach, for which reason they are all accounted *Stomachics*.

§ 5. *Coffee* and *Tea* are now become the general Entertainment of the Ladies, and most People of Fashion drink great quantities of them, and without doubt

doubt very often to their prejudice. The Water is very prejudicial to some, as the Bitterness of the *Coffee* and *Tea* is to others, for none who are of a lax Habit of Body can bear much Water-drinking, nor of a Robust and Tense Habit many Bitters: So that they who will drink these Liquors, should both adapt the Strength and Quantity to their Constitutions.

Fat, Moist, Phlegmatic People, may drink their *Coffee* very strong, with an empty Stomach, without either Sugar, Milk, or Butter; for the more the Fibres are irritated by it, the more strongly will they contract, and thereby the Stomach will cleanse it self from all offensive and superfluous Phlegm, then being admitted into the Mass of Blood, will by encreasing its Motion, lessen its Humidity; it will also become an universal *Stimulus*, and so recover the Tone of the Fibres too much relaxed in such a Constitution. On the contrary, People of a lean, dry, choleric Constitution, should either totally abstain from it, or drink it weak, with Butter or Sugar, upon a full Stomach, for 'tis to Persons of this Constitution that it is so prejudicial, when
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they either take it too strong, or in too great quantities. It dries their solid Parts, expends the *Serum* of the Blood, gives *Palpitations* of the Heart, Trembling of the Hands, a weak and cloudy Pulse, Oppression at the Breast, Synopies, Asthma's, and Vapours; it prevents Sleep, and blackens the Teeth, and all this it doth by an active hot pungent Oil. It affords of this Oil by distilling in a Retort almost double the quantity to either Wheat or Horse-Beans, for which reason it cannot be counterfeited by either of them. *Coffee* yields two Ounces and a half and two Scruples of Oil, whereas the same quantity of Wheat yields but an Ounce and six Drams, and Horse-Beans but an Ounce three Drams and ten Grains.

§ 6. What I've said of *Coffee* is mostly applicable to *Tea*, saving that this makes not so strong an irritation upon the Fibres as *Coffee* does; both are useful in such Cases where drying Decoctions of the Woods and Lime-Water are proper. *Tea* is useful in the Stone (*m.*)

(*m.*) Waldschmid. de Cal. Renum intermonita Medica. Sydenham Opera universa, p. 526. Baglivi de praxi Medica, p. 90.

Sanctorius (n) tells us, That *drinking of Water hinders insensible Perspiration, but advances sensible*. And this not only gives us a hint in what Cases to use it, and what not, but also lets us into the Knowledge of some of its more immediate Effects upon the Humors of our Bodies, for since an encreas'd Perspiration is the effect of an encreas'd Celerity of the Blood's Motion, or an enlargement of the Pores of the Skin (*by the 20th and 21st Proposition of Animal Secretion*) therefore a diminish'd Perspiration must be the effect of a slower Motion in the Blood, or straiter Pores in the Skin: So that Water-drinking is proper in *Fevers*, the *Antients* giving as much as the Patient wou'd drink, as also in all Chronical Distempers in which there is an *Efferescence* of the Humors, such as the *Gout*, *Defluxions*, *Head-Achs*, *Hysterical Illness*, *Falling Sickness*, *Dull Sight*, *Melancholy*, *Bilious*, *Hæmorrhages*, and *Putrifications of the Mouth* (o), as Sir John Floyer informs us. The same Author tells us he hath often put by his *Asthmatic Fits* by drinking Water, and certainly nothing

(n) *Aphor.* 67. § 1.

(o) *Treatise of Asthma*, p. 176.

is less flatulent than Water, having less *Air* contain'd in its Pores than any other Liquor we usually drink, as *made Wines* almost of all Sorts have the most; for which reason they are so offensive to weak Stomachs; for being heated in the Stomach, the *Air* contain'd in 'em unfolds its Spring, and forces its way thro' its upper Orifice in Belching, if the Fibres of the Stomach be not very strong. Besides this, this windy sort of Liquor conveys greater quantities of *Air* into the Mass of Blood, which will so *rarifie* and expand it, as to produce all those Disorders that Water-drinking is so proper to prevent.

§ 7. Our common Spring Water wou'd perform many of the Cures done by Mineral-Waters, cou'd they be taken in the same quantity without any inconvenience, being their Effects upon a Human Body are mostly such as are owing to some obvious Property in Water, such as *diluting* the Blood, *dissolving* its stimulating Salts, *curbing* its Motion, *abating* its Heat, *shutting* up the too patent Pores of the Skin, *scouring* the Stomach and Urinary Passages, &c. But great quantities of Water would relax the Fibres of the Stomach, and spoil both

both Appetite and Digestion, were it not for the *Stipticity* of Mineral Ingredients, which gives those Waters an advantage above others: Besides, their Salts may be a means of carrying them further into the Habit of the Body, and enable them better to open Obstructions than common Water would, and their Salts being *Vitriolic* in all these called *Chalybeats*, may give a better consistence to the Blood grown too lax in Hypochondriac and Scorbutic Bodies.

The great Advantage that *Bath Water* has above others in restoring the lost Appetites of old Debauchees, is owing to its actual Warmth, which makes it so agreeable to Stomachs accustomed to hot Liquors, its Heat makes it more agreeable in the Cholick, tho' the Cure is perform'd by what is common to other Waters, for Water-drinkers are never troubled with this Distemper. I have known some cur'd by drinking Water, after all other means they've try'd have prov'd unsuccessful, and upon their drinking fermented Liquors, their Pains have return'd, which they have cur'd again by repeating their former Experiment.

§ 8. The fermented Liquors commonly in use in this Kingdom, are *Ale*, *Beer*, and *Wine*; and there is this common to 'em all when they are thoroughly fermented, *viz.* That they heat, intoxicate, force Urine, assuage Hunger, excite Thirst, stupify, and promote Perspiration, when taken in great quantities. They are lighter, and less glutinous than either *Wort* or *Muste*. These afford more Oil and fix'd Salt by Distillation, both being in a great measure turned into Spirits in the other; so that fermented Liquors contain a great deal of *Sal Volatile Oleosum* in them, by which they become agreeable to the Stomach, by making a gentle Titillation upon our sensible Fibres and Membranes, and cause an universal Relaxation through the whole *Animal System*. The Blood will, by this means, have a great Impediment to its free Circulation removed, the Diameter of all the Arteries being enlarged, a larger Cylinder of Blood will pass through them without touching their sides, from whence the Resistance proceeds, the Arteries being Conical, and therefore will move with greater Celerity, and consequently encrease the quantity of perspirable Matter

ter and Urine, (*by the 20th Proposition of Secretion*) as also Heat and Thirst, as I've proved in the Chapter of *Acute Distempers*. Hunger being an ungrateful Sensation, they abate that by making a pleasant one, and all the Symptoms of Drunkenness may be accounted for, from an universal Relaxation. Moreover this *Sal Volatile Oleosum* of Fermented Liquors, entring into the Mass of Blood, dissolves, rarifies and expands it, whereby all the forementioned Effects are more easily brought about, and when the Rarefaction is excessive great, the distended Arteries intercept the Passage of so many Spirits into the Heart, as to render it unable to contract it self, with Force enough to drive the circulating Blood to the extremity of the Body; for which reason, People that are very drunk, are *Pale*. From hence we may infer not only the Safety but Necessity of Blood-letting in this Case, both when the Pulse is almost insensible, and the extreme Parts cold. In this drunken Condition a vast quantity of Blood is thrown into the Brain, and those Parts nearest to the Heart, whereby the Tone of their Fibres are destroy'd, (especially if Drunkenness
be

be often repeated) and become so weak as not to be able to carry on the Circulation of the Humors; for which Reason hard Drinkers will be stupid, and subject to *Apoplexies*, *Palsies*, *Vertigo's*, loss of *Memory*, trembling of the *Hands*, loss of *Appetite*, a bad *Digestion*, *Tumors* of the *Liver*, *Spleen*, or *Mesentery*; from whence proceed the *Jaundice* and *Dropsie*, the common Fate of most great Drinkers. Now since these Distempers are the Effects of Drunkenness, and brought about after the manner assign'd, we may hence learn what sort of Strong Drink is the safest to be drunk in great quantities. It must be such as is clear and transparent, and has a dry Pungency upon the Tongue, by which means it will best pass off by Urine and Perspiration. It should also be such as has the least relaxing Property; for which Reason the gentle *Stipticity* there is in *Claret*, renders it generally the most wholesome to be drunk plentifully of any Strong Liquor whatsoever, the great quantity of *Tartar* contain'd in it, prevents it both from relaxing the Stomach, and rarifying the Blood so much as other spirituous Liquors do.

Though

Though Excess in strong Liquors be so prejudicial, yet the moderate Use of 'em are often of great Advantage ; and certainly they are great Blessings to Mankind, inasmuch as they are so very useful in several Cases, when our Spirits are almost exhausted by violent Exercise or hard Labour, or sunk by Pains, Sicknes, or Perturbation of Mind : How comforting is a Glas of some grateful spirituous Liquor ? It blunts the Sense of Pain, exhilarates the drooping Spirits, banishes Melancholy, satisfies Hunger, when Viſuals are not to be had ; 'tis useful in all Distempers where the *Pulse is low*, where the Blood abounds with Serum, where Perspiration is suppressed, and when the Passions of the Mind are violent ; for which Reason the Hypochondriac, the Hydro-pic, and such who have newly taken Cold by a Suppression of Perspiration, ought to drink strong Drink in a moderate Quantity. Nay, 'tis beneficial in Fevers, where the Lowness of the Pulse, the Dejection of the Spirits, and the Coldness and Dryness of the Skin indicate it. Though it must be confessed, that 'tis but few Cases in which

a cool Regimen is not the most proper.

Wine is generally the most agreeable to the Stomach, of any kind of fermented Liquor whatever, both on account of its *Clearness*, and of the *Tartar* contain'd in it ; *Tartar*, or some of its Preparations, being more grateful to the Stomach, in all its Disorders, than any other Medicine ; for these Reasons it is that *French Wines*, especially those of *Burgundy* and *Champaign*, are preferable to those of *Portugal*, *Spain*, or any of the sweet Wines, except when we wou'd drink 'em as a Cordial, in little Quantities. These last, tho' they taste much stronger, and oppress the Stomach, and disorder the Head more than the other, do yet afford much less Spirit by Distillation, their Fermentation being more imperfect, their Oily Parts are unconverted into Spirits, which appears by distilling 'em, for they afford more Oil than the other, and 'tis this half fermented Oil that makes 'em more difficultly digested, more nourishing, and fitter for Men of a dry Constitution. 'Tis to such that *Ale* is more agreeable than Wine, being more soft, smooth,

smooth, and slippery, and consequently more *nourishing*, and fitter to relax the too tense and dry Fibres in such a Constitution. But in general, the nearer our *Malt* Drink approaches to the Nature of Wine, the better it is; therefore it shou'd be made of clear Water, that will bear Soap, be well *Hopp'd*, that it may keep till all the gross viscid Parts are fall'n to the Bottom of the Vessel. It shou'd have a dry Taste, without Sow'rness, and be transparent, shou'd sparkle in a Glass, but the smaller the Bubbles are the better. That *Hopping* of Drink is necessary, is evident from this, that without *Hops*, we must either drink our *Beer* and *Ale*, *New*, *Roapy*, and half *Fermented*, or else *Old* and *Stale*, both which are very prejudicial to our Health. Nay, *Hopp'd* Drink is beneficial even in the *Stone*, as I have oft experienc'd, tho' the common Opinion be against it. *Hops* are a grateful Bitter, and therefore a good Antidote against both *Stone* and *Gout*, according to the Observations of (p) *Sydenham* and

(p) *Opera Univerſa*, p. 418, 419, and 526.

(q) *Waldth-*

(g) *Waldschmidt*, and if they be not prejudicial in the Stone, there are few Cases in which they will be condemn'd. Though it must be own'd, that they, as well as all other Bitters, are improper for Persons of a *Hot* and *Choleric* Constitution.

(g) De Calc. Ren. & Arth. inter Monita Medica.



FINIS.

142 *Handwritten text*